

Physical Public Benefits

REVISED A2.1:

Ecosystem Benefits Exhibits

Temperance Flat Reservoir Project



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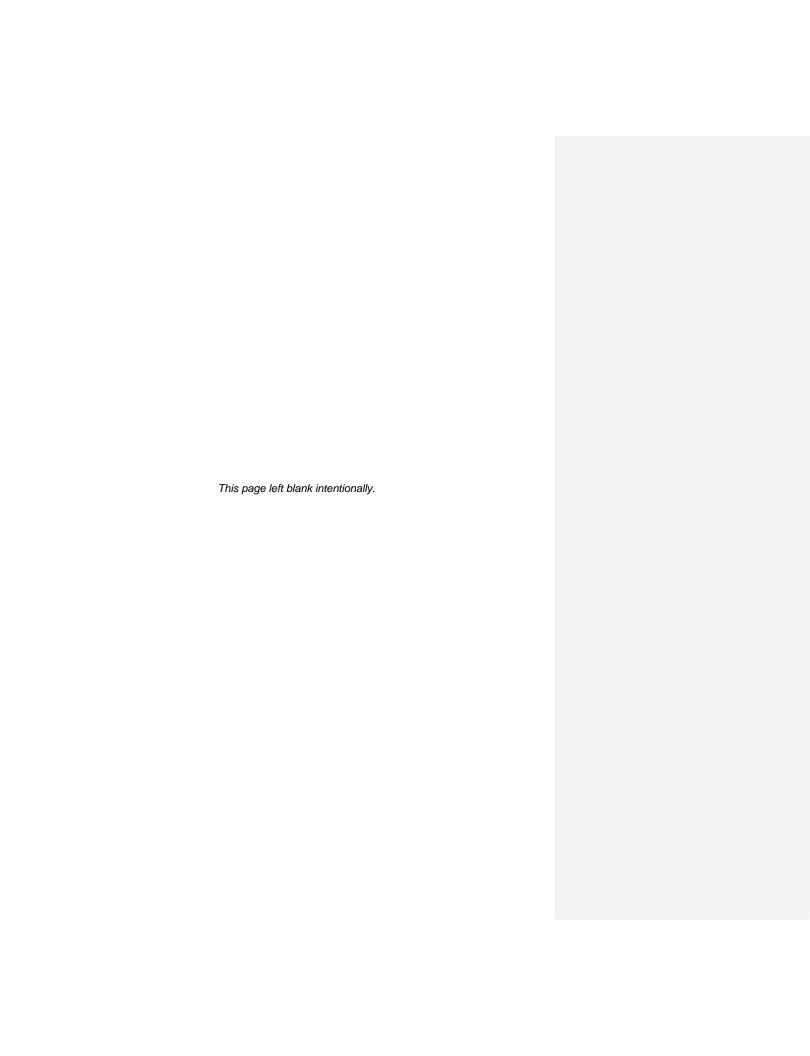


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EXHIBIT MODELING SOURCES AND DATA PROCESSING APPROACH

Exhibit 1: Life History Table

For explanation and supporting documentation on the life stage timing for spring-run Chinook salmon, see BCMR REVISED A5: Modeling Approach, Chapter 5 Ecosystem Modeling, Page 5-1.

Exhibits 2, 3, and 4: Temperature Threshold Analysis – Current, 2030, and 2070 Conditions

Model Source: River Temperature Model (SJR5Q)

Model Reference: BCMR REVISED A5: Modeling Approach, Chapter 4 Temperature Modeling, Page 4-1.

Data Summary:

Part A	Part B	Part C	Part D/range	Part E	Part F
Current Conditions					
DCR2015BASE	Reach01_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	Reach03 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	Reach05_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	Reach 06 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	Reach 09 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	Reach 11_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	Reach 16 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	Reach01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	Reach03_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	Reach05 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	Reach 06 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	Reach 09 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	Reach 11 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	Reach 16 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
2030 Conditions					
CWC2030BASE	Reach01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	Reach03 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	Reach05 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	Reach 06 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	Reach 09 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	Reach 11 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	Reach 16 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	Reach01_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	Reach03 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	Reach05 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	Reach 06_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	Reach 09 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	Reach 11 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	Reach 16_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
2070 Conditions					

Part A	Part B	Part C	Part D/range	Part E	Part F
CWC2070BASE	Reach01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	Reach03 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	Reach05 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	Reach 06 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	Reach 09 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	Reach 11 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	Reach 16 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	Reach01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	Reach03 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	Reach05 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	Reach 06_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	Reach 09 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	Reach 11 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	Reach 16_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP

Note:

Part A

BASE indicates the without-project condition for each simulation

TEMPFLATV4 indicate the with-project condition for each simulation

Part B:

ReachXX_U represents the upstream reach condition from the SJR5Q model

Data Discussion:

SJR5Q outputs river temperature data in 6-hour temperature increments for each reach location. For temperature threshold analysis, the 6-hour temperature is summarized into daily maximum temperatures. These daily maximum temperatures are further summarized into 7-day average maximum (7DADM) temperatures for each reach. These 7DADM temperatures for each reach are used in temperature threshold analysis to compare the without-project and with-project condition effects on temperatures downstream of Friant Dam. For more details on the SJR5Q model and data output see the above model reference.

Temperature threshold analysis process:

- 1. Identify the number of days in the fish life stage and temperature analysis for spring-run and fall-run Chinook salmon (see Exhibit 1, Table 1-1).
- Count the number of days that the temperature threshold is exceeded for the withoutproject and with-project condition.
- 3. Divide the value from Step 2 by the 24-year period of record (1980-2003) to obtain the average annual count.
- 4. To calculate the percent change, take the percent difference from the Without-Project to With-Project. Formula: (With-Project Count /Number of days) (Without-Project Count/Number of Days). A positive percent change means that the With-Project condition has fewer days when the temperature threshold is exceeded compared to the Without-Project condition. A negative percent change means that the With-Project condition has more days when the temperature threshold is exceeded compared to the Without-Project condition.
- 5. This process is repeated for each fish life stage and reach location

- Steps 1 through 5 are completed for all water years and by Restoration water year type (i.e. dry, normal-dry, normal-wet, wet).
- 7. This process is repeated for current, 2030, and 2070 conditions.

Exhibits 5, 6, and 7: Temperature Exceedence Analysis – Current, 2030, and 2070 Conditions

Model Source: River Temperature Model (SJR5Q)

Model Reference: BCMR REVISED A5: Modeling Approach, Chapter 4 Temperature Modeling Page 4-1.

Data Summary:

Part A	Part B	Part C	Part D/range	Part E	Part F	
Current Conditions						
DCR2015BASE	REACH01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP	
DCR2015TEMPFLATV4	REACH01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP	
2030 Conditions						
CWC2030BASE	REACH01_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP	
CWC2030TEMPFLATV4	REACH01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	<u>RIVTEMP</u>	
2070 Conditions						
CWC2070BASE	REACH01_U	TEMP_F_7_DAY_MAX	01JAN1980-01JAN2003	1DAY	RIVTEMP	
CWC2070TEMPFLATV4	REACH01 U	TEMP F 7 DAY MAX	01JAN1980-01JAN2003	1DAY	<u>RIVTEMP</u>	
Makes						i

Note:

Part A:

BASE indicates the without-project condition for each simulation

TEMPFLATV4 indicate the with-project condition for each simulation

Part B:

ReachXX U represents the upstream reach condition from the SJR5Q model

Data Discussion:

SJR5Q outputs river temperature data in 6-hour temperature increments for each reach location For temperature threshold analysis, the 6-hour temperature is summarized into daily maximum temperatures. These daily maximum temperatures are further summarized into 7-day average maximum (7DADM) temperatures for each reach. These 7DADM temperatures for each reach are used in temperature exceedence analysis to compare the without-project and with-project condition effects on temperatures released from Friant Dam. For more details on the SJR50 model and data output see the above model reference.

Temperature Exceedence Analysis process:

- 1. The Reach01_U 7DADM for all water years for the without-project and with-project condition is ranked from highest to lowest
- To show exceedence, percentage values are assigned to the ranked Reach01 U 7DADM data, starting from 0% for the highest data value to 100% for the lowest data value.

- 3. The ranked Reach01_U data is plotted against the assigned percentage value to show the temperature exceedence curve for the without-project and with-project condition.
- 4. This process is repeated for current, 2030, and 2070 conditions.

Exhibit 8: Cold Water Pool Analysis

Model Source: River Temperature Model (SJR5Q)

Model Reference: BCMR REVISED A5: Modeling Approach Attachment, Chapter 4
Temperature Modeling, Page 4-1

Data Summary:

<u>Spreadsheet</u>	Project Condition
Current Condition	
For_ICF_DCR2015_Base	Without-Project
For ICF DCR2015TEMPFLATV4	With-Project
2030 Condition	
For ICF CWC2030	Without-Project
For ICF CWC2030TEMPFLATV4	With-Project
2070 Condition	•
For ICF CWC2070Base	Without-Project
For_ICF_CWC2070TEMPFLATV4	With-Project

Data Discussion:

Each spreadsheet summarized above is the processed SJR5Q outputs converted into mean daily flow and mean maximum daily temperature by Restoration water year type (wet, normal-wet, normal-dry, and dry) by reach location for raw data input for the EDT model. The mean daily flow is the flow at the upstream location of Reach 1 (Reach01 U) computed from the River Temperature Model output. The mean maximum daily temperatures were computed based on the average of the upstream and downstream reach location (i.e. mean maximum daily temperature of Reach 1 is the average of Reach01 U and downstream location of Reach 1 (Reach01 D) from the River Temperature Model output). Reach 1 represents the location just below Friant Dam. For cold water pool analysis, the mean maximum daily temperatures for wet water year type is analyzed at Reach 1 for without-project and with-project condition. For more details on the SJR5Q model and data output see the above model reference.

Cold Water Pool Analysis process:

- Take the without-project and with-project Reach 1 mean maximum daily temperature for wet year types and convert from degrees Fahrenheit to degrees Celsius.
- The without-project and with-project convert values from Step 1 are then plotted on a oneyear time series.
- 3. This process is repeated for current, 2030, and 2070 conditions.

Exhibit 9: EDT Results

For further details on the EDT model and assumptions, see BCMR REVISED A5: Modeling Approach Attachment, Chapter 5 Ecosystem Modeling, Page 5-1.

<u>Exhibits 11, 12, and 13: Flow Exceedence – Current, 2030, and 2070 Conditions</u> <u>Model Source: Daily Model</u>

Model Reference: BCMR REVISED A5: Modeling Approach, Chapter 3 Operations Modeling Page 3-1.

Data Summary:

•	r	1		1	
Part A	Part B	Part C	Part D/range	Part E	Part F
<u>Current Conditions</u>					
DCR2015BASE	Millerton	Rel-Outlet Total	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
DCR2015BASE	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	DailyModel
DCR2015TEMPFLATV4	Millerton	Rel-Outlet Total	1JAN1921-01JAN2003	1DAY	DailyModel
DCR2015TEMPFLATV4	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	DailyModel
2030 Conditions					
CWC2030BASE	Millerton	Rel-Outlet_Total	1JAN1921-01JAN2003	1DAY	DailyModel
CWC2030BASE	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	DailyModel
CWC2030TEMPFLATV4	Millerton	Rel-Outlet Total	1JAN1921-01JAN2003	1DAY	DailyModel
CWC2030TEMPFLATV4	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	DailyModel
2070 Conditions					
CWC2070BASE	Millerton	Rel-Outlet_Total	1JAN1921-01JAN2003	1DAY	DailyModel
CWC2070BASE	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
CWC2070TEMPFLATV4	Millerton	Rel-Outlet_Total	1JAN1921-01JAN2003	1DAY	DailyModel
CWC2070TEMPFLATV4	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	DailyModel

Note:

Part A:

BASE indicates the without-project condition for each simulation

TEMPFLATV4 indicates the with-project condition for each simulation

Part B

Rel-Outlet_Total indicates the total outlet release out of Friant Dam (Millerton)

Rel-Spill indicates the spills out of Friant Dam (Millerton)

Data Discussion:

Daily Model is an Excel-based daily operation model to disaggregate monthly water operations into a daily set of water operations for use in further analyses. The without-project operations reads monthly CalSim II water operations whereas the with-project operations reads monthly GamingTool water operations. For flow exceedence analysis, the sum of total release from Friant Dam and spills from Friant Dam is compared between the without-project and with-project condition. For more details on CalSim II, GamingTool and Daily Model outputs see the above model reference.

Flow Exceedence Analysis process:

- 1. The Rel-Outlet_Total and Rel-Spill is summed for the without-project and with-project condition to get the total flow release from Friant Dam.
- 2. The summed total release from Friant Dam for without-project and with-project condition is ranked from highest to lowest.
- 3. To show exceedence, percentage values are assigned to the ranked summed total release data, starting from 0% for the highest data value to 100% for the lowest data value.
- 4. The ranked summed total release data is plotted against the assigned percentage value to show the flow exceedence curve for the without-project and with-project condition.
- 5. This process is repeated for current, 2030, and 2070 conditions.
- 6. These figure tells three key pieces of information:
 - a. High inflows are reduced in the with-project condition. These high inflows would be stored in Temperance Flat Reservoir (TFR). All releases would meet the SJRRP Restoration Flow requirements.
 - Middle inflows are increased in the with-project condition. These flows from TFR
 project would supplement flow in the San Joaquin River (SJR) above the SJRRP
 Restoration Flow requirements.
 - c. Low inflows are maintained in the with-project condition. These flow releases to the SJR would be SJRRP Restoration Flows.

Exhibits 14, 15, and 16: Monthly Average Flow – Current, 2030, and 2070 Conditions Model Source: Daily Model

Model Reference: BCMR REVISED A5: Modeling Approach, Chapter 3 Operations Modeling, Page 3-1.

Data Summary:

	I	I	I		
Part A	Part B	Part C	Part D/range	Part E	Part F
Current Conditions					
DCR2015BASE	Millerton	Rel-Outlet Total	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
DCR2015BASE	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
DCR2015TEMPFLATV4	Millerton	Rel-Outlet_Total	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
DCR2015TEMPFLATV4	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
2030 Conditions					
CWC2030BASE	Millerton	Rel-Outlet Total	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
CWC2030BASE	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
CWC2030TEMPFLATV4	Millerton	Rel-Outlet_Total	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
CWC2030TEMPFLATV4	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	DailyModel
2070 Conditions					
CWC2070BASE	Millerton	Rel-Outlet Total	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
CWC2070BASE	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
CWC2070TEMPFLATV4	Millerton	Rel-Outlet Total	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>
CWC2070TEMPFLATV4	Millerton	Rel-Spill	1JAN1921-01JAN2003	1DAY	<u>DailyModel</u>

Part A	Part B	Part C	Part D/range	Part E	Part F			
Note:								
Part A:								
BASE indicates the without-pro	ject condition for ea	ach simulation						
TEMPFLATV4 indicates the wi	TEMPFLATV4 indicates the with-project condition for each simulation							
Part B:								
Rel-Outlet Total indicates the t	otal outlet release o	out of Friant Dam (Mille	erton)					
Dol Spill indicates the spills out	Pol Call indicates the call least of Frient Dam (Millartan)							

Data Discussion:

Daily Model is an Excel-based daily operation model to disaggregate monthly water operations into a daily set of water operations for use in further analyses. The without-project operations reads monthly CalSim II water operations whereas the with-project operations reads monthly GamingTool water operations. For flow exceedence analysis, the sum of total release from Friant Dam and spills from Friant Dam is compared between the without-project and with-project condition. For more details on CalSim II, GamingTool and Daily Model outputs see the above model reference.

Monthly Average Flow process:

- The daily Rel-Outlet Total and Rel-Spill values are summed for the without-project and with-project condition to get the total daily flow release from Friant.
- The total daily flow release from Friant for without-project and with-project condition are averaged get monthly total release from Friant.
- Take the average of the monthly total releases from Friant Dam by Restoration water year type (wet, normal-wet, normal-dry, dry, critical-low, and critical-high).
- 4. Plot the average monthly total release by water year type.
- 5. Calculate the percentage change from the with-project to the without-project condition fo each month. A negative percent change means that the with-project condition has lowe average monthly Friant releases. A positive percent change means that the with-project condition has higher average monthly Friant releases.
- 6. This process is repeated for current, 2030, and 2070 conditions.

Exhibits 17, 18, and 19: Monthly Release Pattern – Current, 2030, and 2070 Conditions Model Source: Gaming Tool

Model Reference: BCMR REVISED A5: Modeling Approach, Chapter 3 Operations Modeling Page 3-1.

Data Summary:

Gaming Tool Excel Files			
Condition	Spreadsheet*	Tab/Column	Data**

Current 2030	GamingTool_DCR2015TempFlatV4 GamingTool_CWC2030TempFlatV4		DailyModelInput/Column I		CalSim/	CalSim/C18M/Flow-Main	
<u>2070</u>	GamingTool CWC2070TempFlatV4						
*TempFlatV4	4 indicates the with	n-project condition.					
**This is the	SJRRP Restoration	on Flow Requirement. The	se values are	the same in the three Gamino	gTool sprea	dsheets.	
GamingToo	I DSS File						
Part A		Part B	Part C	Part D/range	Part E	Part F	
Current Cond	<u>ditions</u>						
DCR2015TE	MPFLATV4	Refuge	Delivery	01Oct1921-30Sep2003	1MON	GamingTool	
DCR2015TE	MPFLATV4	Westside Inflow	Delivery	01Oct1921-30Sep2003	1MON	GamingTool	
DCR2015TE	MPFLATV4	Westside Exchange	Delivery	01Oct1921-30Sep2003	1MON	GamingTool	
DCR2015TE	MPFLATV4	Westside Exchange	Spill	01Oct1921-30Sep2003	1MON	GamingTool	
2030 Condition	ons						
CWC2030TE	EMPFLATV4	Refuge	<u>Delivery</u>	01Oct1921-30Sep2003	1MON	<u>GamingTool</u>	
CWC2030TE	MPFLATV4	Westside Inflow	<u>Delivery</u>	01Oct1921-30Sep2003	1MON	<u>GamingTool</u>	
CWC2030TE	EMPFLATV4	Westside Exchange	Delivery	01Oct1921-30Sep2003	1MON	<u>GamingTool</u>	
CWC2030TE	EMPFLATV4	Westside Exchange	Spill	01Oct1921-30Sep2003	1MON	<u>GamingTool</u>	
2070 Condition	ons						
CWC2070TE	EMPFLATV4	Refuge	Delivery	01Oct1921-30Sep2003	1MON	<u>GamingTool</u>	
CWC2070TE	MPFLATV4	Westside Inflow	<u>Delivery</u>	01Oct1921-30Sep2003	1MON	<u>GamingTool</u>	
CWC2070TE	EMPFLATV4	Westside Exchange	Delivery	01Oct1921-30Sep2003	1MON	GamingTool	
CWC2070TE	EMPFLATV4	Westside Exchange	Spill	01Oct1921-30Sep2003	1MON	GamingTool	
Note:	-						
Part A:							
TEMPFLAT\	/4 indicates the wi	ith-project condition for ea	ch simulation				

Data Discussion:

Gaming Tool Excel Files

This data is the SJRRP Restoration flows, these values came from CalSim and are the same for the current, 2030 and 2070 condition. This is labeled as Restoration in the Exhibits.

GamingTool DSS File

Refuge delivery is the incremental level 4 refuge delivery computed for current, 2030 and 2070 with-project conditions in the Gaming Tool. This is labeled as Incremental Level 4 Refuge Flow.

Westside Inflow delivery is the account delivery computed for current, 2030 and 2070 with-project conditions in the Gaming Tool.

Westside Exchange delivery is the account delivery computed for current, 2030 and 2070 with-project conditions in the Gaming Tool.

The sum of Westside Inflow delivery and Westside Exchange delivery is labeled as Delivery in the Exhibits.

Westside Exchange spill is the spill from the account computed for current, 2030 and 2070 with-project conditions in the Gaming Tool. This is labeled as Flood Release in the Exhibits.

<u>Exhibits 21, 22, and 23: Floodplain Activation Flow – Current, 2030, and 2070 Conditions</u>

<u>Model Source: River Temperature Model (SJR5Q)</u>

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Model Reference: BCMR REVISED A5: Modeling Approach, Chapter 4 Temperature Modeling, Page 4-1.

Data Summary:

Part A	Part B	Part C	Part D/range	Part E	Part F
Current Conditions					
DCR2015BASE	REACH01 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH02 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH03 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH04 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH05 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH06 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH09 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH10 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH11 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH12 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH13 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH14 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH15 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH16 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH17 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015BASE	REACH18 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH01 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH02 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH03 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH04 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH05 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH06 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH09 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH10 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH11 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
OCR2015TEMPFLATV4	REACH12 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
OCR2015TEMPFLATV4	REACH13 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH14 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH15 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH16 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
DCR2015TEMPFLATV4	REACH17 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
OCR2015TEMPFLATV4	REACH18 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
2030 Conditions					
CWC2030BASE	REACH01 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH02 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH03 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH04 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH05 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH06 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH09 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH10 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH11 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH12 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH13 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH14 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH15 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH16 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH17 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030BASE	REACH18 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP

Part A	Part B	Part C	Part D/range	Part E	Part F
CWC2030TEMPFLATV4	REACH01 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH02 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH03 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH04 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH05 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH06 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH09 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH10 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH11 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH12 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH13_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH14 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH15 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH16_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH17 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2030TEMPFLATV4	REACH18 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
2070 Conditions					
CWC2070BASE	REACH01 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH02 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH03_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH04 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH05_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH06_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH09 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH10_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH11_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH12 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH13_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH14_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH15 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH16_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH17 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070BASE	REACH18 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH01_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH02 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH03 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH04_U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH05 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH06 U	<u>FLOW</u>	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH09_U	<u>FLOW</u>	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH10 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH11 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH12 U	<u>FLOW</u>	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH13 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH14 U	<u>FLOW</u>	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH15 U	<u>FLOW</u>	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH16 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH17 U	<u>FLOW</u>	01JAN1980-01JAN2003	1DAY	RIVTEMP
CWC2070TEMPFLATV4	REACH18 U	FLOW	01JAN1980-01JAN2003	1DAY	RIVTEMP
Note:					

Part A:
BASE indicates the without-project condition for each simulation

TEMPFLATV4 indicate the with-project condition for each simulation Part B:

ReachXX U represents the upstream reach condition from the SJR5Q model

Data Discussion:

SJR5Q outputs river temperature data in 6-hour flow increments for each reach location. Fo temperature threshold analysis, the 6-hour flow is summarized into daily average flows. Each reach has an upstream and downstream location, for this analysis the upstream reach location denoted as ReachXX_U in the above data summary table, is used for floodplain activation flow analysis. For more details on the SJR5Q model and data output see the above model reference

Floodplain Activation Flow analysis process

- For each reach location, select the mid-March through mid-May data for each year (1980-2003).
- Take the 7-day moving minimum value from the mid-March through mid-May data for each
 year from Step 1.
- 3. Take the maximum value of the 7-day moving minimums for each year from Step 2.
- 4. Rank the maximum 7-day moving minimums from Step 3 from highest to lowest value Sort the data by all years and Restoration year type (wet, normal-wet, normal-dry and dry)
- Select the Floodplain Activation Flow for all year and by water year type. The Floodplain Activation Flow is taken as the flow that will occur 2 out of 3 years (i.e. flows with a 67% frequency of occurrence).
- 6. Repeat steps 1 through 5 for the with-project condition.
- 7. Tabulate the Floodplain Activation flows computed for without-project and with-project condition by all years and water year types. The percent change is change from the without-project condition to the with-project condition. A positive percent change indicates that the Floodplain Activation Flow has increased in the with-project condition relative to the without-project condition for that reach. A negative percent change indicates that the Floodplain Activation Flow has decreased in the with-project condition relative to the without-project condition for that reach.
- 8. Repeat Steps 1 through 7 for current, 2030 and 2070 conditions.

Exhibit 24: Floodplain Activation Analysis Procedure

This figure outlines the process analysis for determining the Floodplain Activation Flow (FAF). This was used to develop Exhibits 21, 22, and 23: Floodplain Activation Flow – Current, 2030 and 2070 Condition

Background: "Floodplain activation flow" (FAF) is defined as "the smallest flood pulse that initiates substantial beneficial ecological processes when associated with floodplain inundation' by Williams et al. (2009) ("Quantifying Activated Floodplains on a Lowland regulated River: Its Application to Floodplain Restoration in the Sacramento Valley"). The authors of this paper define this for the Sacramento River as the river stage that is exceeded in 2 out of 3 years for 7 days in mid-March to mid-May.

Part A) Typical Daily Stage Hydrograph

Step 1: Flow data (1980-2003) is called from the most upstream point of each of reach of interest and used as a representative flow for the reach. The flow data for each reach is an output from the River Temperature Model.

Part B) Selection of Activation Flow for a Particular Year

Step 2: Flow during the spring flow period (March 15 – May 15) for each year of record is selected.

Step 3: Running 7-day minimums are calculated for the spring flow period for each year starting on March 21, the seventh day in this period.

Step 4: The maximum of these running minimums for each year of record is selected and called 7-day minimum maximums.

Part C) Selection of Floodplain Activation Flow from Period of Record

Step 5: The yearly maximums are ranked by magnitude, highest to lowest. Since the FAF is defined as "stage (or flow, the author states) that is exceeded in 2 out of 3 years" and the 24 year record is ranked, the 16th highest flow (or 8th lowest flow) is selected as the FAF.

Step 6: The resulting FAF for each reach is compared to other operational conditions.

EXHIBIT 1 LIFE HISTORY TABLE

Table 1-1. Temporal Occurrence of Each Life Stage of Fall-Run and Spring-Run Chinook Salmon in the San Joaquin River and Major Tributaries (Merced, Tuolumne, and Stanislaus Rivers)

	Threshold ¹								Mont	h									
Life Stage		Jan	Feb	Mar	Apr	May	Ju	n	Jul		Aug	g	Se	р	Oct	No	v	De	C
Chinook Salmon (Fa	II-Run)																		
Adult migration	18°C																		
Spawning	13°C																		
Incubation and	13°C																		П
emergence																			
Juvenile/fry rearing	16°C																		
Juvenile migration	18°C																		T
Chinook Salmon (Sp	ring-Run)																		
Adult migration	18°C																		1
Spawning	13°C																		
Incubation and	13°C																		
emergence																			
Juvenile/fry rearing	16°C																		
Juvenile migration	18°C																		

SJRRP 2012, J. Hannon, pers com. (for fall-run Chinook salmon)

SJRRP March 2014, Technical Report: Analysis of Fish Benefits of Reach 2B Alternatives of the San Joaquin River (for spring-run Chinook salmon)

The timing for spring-run Chinook salmon adult migration begins February 20

	No presence
	Some presence
	Peak presence
¹ Threshol	d criteria set by the EPA

Temperance Flat Reservoir Proj	ect	
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EXHIBIT 2 TEMPERATURE THRESHOLD **ANALYSIS - CURRENT CONDITIONS**

Note: A decrease in the number of days above the threshold for the with-project condition compared to the without-project is considered a temperature improvement.

Table 2-1. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions - All Water Years

				emperature		Analysis Cu	rrent Cond	itions - All Y	ear Types		
Lifes	stage	Adult M	igration	Spav	vning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	, C		° C	16	° C	18	° C
Total Day	s In Period	Mar- n (Total	nid July		g - Oct 1,793)		g - Mar 5,356)	Jan - (Total	Dec Occo		May 3,619)
Cui	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	675	28	1770	74	27	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	296	12	1212	51	0	0	0	0
Post 267.6)	% Change	0.0	0%	-21	.1%	-10	.4%	-0.	3%	0.0	0%
Upstream Reach 1B:	Without-Project	1235	51	1793	75	3112	130	4297	179	441	18
Highway 99 (SJRRP Mile	With-Project	1119	47	1793	75	4110	171	4267	178	355	15
Post 243.1)	% Change	-3.	5%	0.0% 18.6% -0.		3%	-2.	4%			
Upstream Reach 2A:	Without-Project	1352	56					4637	193	525	22
Gravelly Ford	With-Project	1580	66					5188	216	722	30
(SJRRP Mile Post 229.0)	% Change	6.9	9%					6.4	1%	5.4	4%
Upstream Reach 2B;	Without-Project	1583	66							667	28
Chowchilla Bypass	With-Project	1996	83							985	41
(SJRRP Mile Post 216.0)	% Change	12.	6%							8.8	3%
Upstream Reach 3;	Without-Project	1809	75							813	34
Mendota Dam (SJRRP Mile	With-Project	2150	90							1079	45
Post 204.6)	% Change	10.	4%							7.4	4%
Upstream Reach 4; Sack	Without-Project	1989	83							937	39
Dam (SJRRP Mile Post	With-Project	2361	98							1282	53
182.0)	% Change	11.	3%							9.5	5%
Upstream Reach 5; Bear	Without-Project	2641	110							1571	65
Creek Confluence (SJRRP Mile	With-Project	2721	113							1644	69
Post 135.8)	% Change	2.4	1%							2.0	0%

1.) % Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

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Current Count Annual Count Annual Count Annual Count Annual Count Annual		Spring-r	run Chinool	Salmon Te	emperature	Threshold	Analysis Cu	rrent Cond	itions - All \	ear Types		
Threshold 18°C 13°C 13°C 13°C 16°C 16°C 760 12 12 12 12 12 13 13 10 10 13 10 10 10 10 10 10 10 10 10 10 10 10 10	Life				· •		Incubat	tion and			Juvenile	Migration
Court Cou		ŭ		•								
Courrent Count	Total Day	rs In Period										
Reach 1A; Friend Dam (SJRRP Mile Post 267.6) With-Project Solution With-Project Solution Solution	Cui	rrent	Count	Annual	Count	Annual	Count	Annual	Count	Annual	Count	Average Annual Count
Friant Dam (SJRRP Mile Pool		Without-Project	0	0	1320	55	1725	72	27	1	0	0
Post 267.6) % Change	Friant Dam	With-Project	0	0	616	26	1212	51	0	0	0	0
Reach 1 B; Highway 99 (SJRRP Mile Post 243.1) Writh-Project 558 23 2096 87 2619 109 4267 178 798 33 Upstream Reach 22; Gravelly Ford (SJRRP Mile Post 243.1) Writh-Project 776 32 4637 193 1043 43 Upstream Reach 2B; Chrowchilla Bypass (SJRRP Mile Post 204.6) Writh-Project 980 41 5188 216 1255 52 Upstream Reach 2B; Chrowchilla Bypass (SJRRP Mile Post 204.6) 955 40 4637 193 1043 43 Upstream Reach 2B; Chrowchilla Bypass (SJRRP Mile Post 204.6) 955 40 4637 193 1043 43 Upstream Reach 2B; Chrowchilla Writh-Project 1313 55 1261 53 1651 69 Upstream Reach 3; Seet Dam (SJRRP Mile Post 135.8) Writh-Project 1125 47 47 47 47 47 48 48 48 48 48 48 48 48 48 48 48 48 48 48 48 48 <t< td=""><td></td><td>% Change</td><td>0.0</td><td>0%</td><td>-33</td><td>.2%</td><td>-14</td><td>.4%</td><td>-0.</td><td>Rearing Juvenile II C 18* Dec Feb. 3.668) (Total: Average Annual Count 1 0 0 0 0 19% 0.0 179 933 178 798 193 1043 216 1255 2161 1651 10. 1456 1791 9.3 1632 2002 10. 2291</td><td>)%</td></t<>		% Change	0.0	0%	-33	.2%	-14	.4%	-0.	Rearing Juvenile II C 18* Dec Feb. 3.668) (Total: Average Annual Count 1 0 0 0 0 19% 0.0 179 933 178 798 193 1043 216 1255 2161 1651 10. 1456 1791 9.3 1632 2002 10. 2291)%	
Highway 99 (SJRRP Mile Project Mith-Project Mithout-Project Mithout-P		Without-Project	681	28	2123	88	2587	108	4297	179	933	39
Post 243.1) % Change	Highway 99	With-Project	558	23	2096	87	2619	109	4267	178	798	33
Reach 2A, Gravelly Ford (SJRRP Mile Post 229.0) With-Project 980 41 55 <td></td> <td>% Change</td> <td>-4.</td> <td>4%</td> <td>-1.</td> <td>3%</td> <td>0.9</td> <td>9%</td> <td>-0.</td> <td>3%</td> <td>-3.</td> <td>7%</td>		% Change	-4.	4%	-1.	3%	0.9	9%	-0.	3%	-3.	7%
Strawelly Ford (SJRRP Mile Post 229.0)		Without-Project	776	32					4637	193	1043	43
Post 229.0 % Change 7.3% 6.4% 5.9%	Gravelly Ford	With-Project	980	41					5188	216	1255	52
Reach 2B; Chowchilla Bypass (SJRRP Mile Post 216.0) Without-Project (Mith-Project Mile) 1313 55 Upstream Reach 3; Mendota Dam (SJRRP Mile Post 204.6) Without-Project Mile Project Mile Post 204.6) 1125 47 1456 61 Upstream Reach 4; Sack Dam (SJRRP Mile Post 132.0) Without-Project Mile Post 1274 53 9.3% Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project Mile Post Mile Mile Mile Mile Mile Mile Mile Mile		% Change	7.3	3%					6.4	1 %	5.9	9%
Bypass (SJRRP Mile Post 216.0) Change 12.8% 10.8%		Without-Project	955	40							1261	53
Post 216.0 % Change 12.8% 10.8%	Bypass	With-Project	1313	55							1651	69
Reach 3; Mendota Dam (SJRRP Mile Post 204.6) With-Project 1437 60 1791 75 Upstream Reach 4; Sack 182.0) With-Project 1274 53 1632 68 Dum (SJRRP Mile Post 182.0) With-Project 1642 68 2002 83 Upstream Reach 5; Bear Creek Confluence (SJRRP PMile Post 135.8) With-Project 1931 80 2291 95 Ustream Reach 5; Bear Creek Confluence (SJRRP PMile Post 135.8) With-Project 2004 84 2364 99 Vistram Project (SJRRP PMile Post 135.8) % Change 2.6% 2.0 2.0 2.0		% Change	12.	.8%							10.	8%
Mendota Dam (SJRRP Mile Post 204.6) With-Project % Change 11.37 60 9.3 ★ 1791 75 75 75 9.3 ★ 182.0 9.3 ★ 1632 88 88 2002 83 83 1632 88 2002 83 80 2291 95 Ubstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 1931 80 2291 95 USh P Mile Post 135.8) With-Project 2004 84 2364 99		Without-Project	1125	47							1456	61
Post 204.6 % Change	Mendota Dam	With-Project	1437	60							1791	75
Reach 4; Sack Dam (SJRRP) Mile Project With-Project 1642 68 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) With-Project 1931 80 Cyber Fam Creek Confluence (SJRRP Mile Post 135.8) With-Project 2004 84 Vish-Project (SJRRP Mile Post 135.8) 2004 84		% Change	11.	2%							9.3	3%
Dam (SJRRP Mile Post 182.0) With-Project 1642 68 2002 83 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 1931 80 2291 95 Ustream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) With-Project 2004 84 2364 99 SWARP Mile Post 135.8) % Change 2.6% 2.0% 1.0% 1.0%		Without-Project	1274	53							1632	68
182.0) % Change 13.2% 10.3% Uestream Uestream 2291 95 Creek Without-Project 2004 84 2364 99 CSJRRP Mile With-Project 2.6% 2.0% 2.0%	Dam (SJRRP		1642	68							2002	83
Reach 5; Bear Creek Without-Project 1931 80 2291 95 Confluence (SJRRP Mile Post 135.8) With-Project 2004 84 2364 99 Value Post 135.8) % Change 2.6% 2.0%		% Change	13.	2%							10.	3%
Confluence (SJRRP Mile Post 135.8) With-Project 2004 84 2364 99 2.6% 2.6% 2.0%	Reach 5; Bear	Without-Project	1931	80							2291	95
Post 135.8) % Change 2.6% 2.0%	Confluence	With-Project	2004	84							2364	99
	Post 135.8)	% Change	2.0	6%							2.0)%

1,1 % Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 2-2. Count and Percent of Exceedence of the 7DADM Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – **Dry Water Years**

	Spring-run	Chinook Sa	almon Temp	perature Th	reshold Ana			ns- Dry Wa	ter Year Ty	Эе	
Lifes	stage	Adult M	ligration	Spav	vning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period		nid July (685)		g - Oct (380)		ıg - Mar (1137)	Jan - Total (Dec (1827)	Jan - Total	May (757)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	113	5	336	14	8	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	0	0	96	4	0	0	0	0
Post 267.6)	% Change	0.0	0%	-29	.7%	-21	.1%	-0.	4%	0.0	0%
Upstream Reach 1B:	Without-Project	419	17	380	16	669	28	1106	46	194	8
Highway 99 (SJRRP Mile	With-Project	371	15	380	16	811	34	1037	43	163	7
Post 243.1)	% Change	-7.	0%	0.0	0%	12	.5%	-3.	8%	-4.	1%
Upstream Reach 2A;	Without-Project	464	19					1149	48	239	10
Gravelly Ford (SJRRP Mile	With-Project	457	19					1134	47	232	10
Post 229.0)	% Change	-1.	0%					-0.	8%	-0.	9%
Upstream Reach 2B;	Without-Project	509	21							284	12
Chowchilla Bypass	With-Project	512	21							287	12
(SJRRP Mile Post 216.0)	% Change	0.4	4%							0.4	4%
Upstream Reach 3;	Without-Project	512	21							287	12
Mendota Dam	With-Project	527	22							302	13
(SJRRP Mile Post 204.6)	% Change	2.:	2%							2.0	0%
Upstream Reach 4; Sack	Without-Project	532	22							307	13
Dam (SJRRP Mile Post	With-Project	549	23							324	14
182.0)	% Change	2.5	5%							2.2	2%
Upstream Reach 5; Bear	Without-Project	607	25							382	16
Creek Confluence	With-Project	612	26							387	16
(SJRRP Mile Post 135.8)	% Change	0.1	7%							0.7	7%

1.) % Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Math		Spring-run	Chinook Sa	almon Temp	erature Th	reshold Ana	lysis Curre	nt Conditio	ns- Dry Wa	ter Year Ty	pe	
Threshold 18° C 13° C	Lifes	stage	Adult M	igration	Spav	vning			Juvenile	Rearing	Juvenile	Migration
Total Lays	Thre	shold	18	°C	13'	° C			16	° C	18	, C
Court Cour	Total Day	s In Period										
Upstream Reach 1A; Froject 0 0 0 263 11 336 14 8 0 0 0 0 0 0 0 0 0				Average Annual		Average Annual		Average Annual		Average Annual		Average Annual
Mith-Project 0 0 0 28 1 96 4 0 0 0 0 0		Without-Project	0		263		336		8		0	
Post 267.6 % Change 0.0	Friant Dam		0	0	28	1	96	4	0	0	0	0
Reach 18 Highway 98 (SJRRP Mile Post 243.1)		% Change	0.0)%	-51	.6%	-31	.4%	-0.	4%	0.0)%
Highway 99 (SJRRP Mile Project 221 9 443 18 493 21 1037 43 296 12		Without-Project	269	11	455	19	539	22	1106	46	344	14
Post 243.1) % Change	Highway 99	With-Project	221	9	443	18	493	21	1037	43	296	12
Reach 2A, Gravelly Ford (SJRRP Mile Post 229.0) With-Project 307 13 1134 47 382 16 36 16 36 16 36 16 36 16 362 16 36 16 382 16 382 16 382 16 382 18 437 18 437 18 437 18 437 18 437 18 437 18 437 18 437 18 437 18 437 18 452 19 Upstream Reach 3; Mendota Dam (SJRRP Mile Post 204.6) With-Project 362 15 457 16 452 19 457 19 457 19 457 19 474 20 20 37 16 474 20 37 19 474 20 37 19 474 20 37 474 20 37 474 20 37 474 20 37 474 20 37 474	Post 243.1)	% Change	-8.	2%	-2.	6%	-6.	0%	-3.	8%	-6.4%	
State Sta		Without-Project	314	13					1149	48	389	16
Post 229.0) % Change 1.2%	Gravelly Ford	With-Project	307	13					1134	47	382	16
Reach 2B; Chowchilla Bypass (SJRRP Mile Post 216.0) 362 15 437 18 Upstream (SJRRP Mile Post 24.6) With-Project 362 15 437 18 Upstream (SJRRP Mile Post 24.6) With-Project 362 15 457 18 Upstream (SJRRP Mile Post 24.6) With-Project 377 16 452 19 Upstream (Reach 4; Sack Dam (SJRRP Mile Post 182.0) Without-Project 382 16 457 19 Upstream (Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 462 19 532 22 Vith-Project (SJRRP Mile Post 135.8) 462 19 537 22		% Change	-1.	2%					-0.	8%	389 16 382 16 -0.9% 434 18 437 18	9%
Bypass (SJRRP Mile Post 216.0) Change 0.5%		Without-Project	359	15							434	18
Post 216.0 % Change 0.5%	Bypass	With-Project	362	15							437	18
Reach 3; Mendota Dam (SURRP Mile Post 204.6) With-Project 377 16 452 19 Upstream Reach 4; Sack Dam (SuRRP Mile Post 182.0) With-Project 382 16 457 19 Upstream Reach 5; Sack Dam (SuRRP Mile Post 182.0) With-Project 399 17 474 20 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 457 19 532 22 Vistn-Project 462 19 537 22 Vistn-Project (SJRRP Mile Post 135.8) % Change 0.9% 0.9% 0.9%		% Change	0.5	5%							0.4	1%
Mendota Dam (SJRRP Mile Post 20.46) With-Project 377 16 2.6** 19 2.6** 2.6** 19 457 19 457 19 457 19 457 20 2.6** 457 20 2.6** 457 20 2.6** 457 20 2.6** 457 20 2.6** 457 20 2.6** 457 22 23 22 23 24 24 24 24 24 2		Without-Project	362	15							437	18
Post 204.6) % Change 2.6%	Mendota Dam	With-Project	377	16							452	19
Reach 4; Sack Dam (SJRRP Mile Posit 182.0) With-Project 182.9* 399 17 474 20 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 467 19 532 22 (SJRRP Mile Post 135.8) With-Project 962 462 19 537 22		% Change	2.6	6%							2.0)%
Dam (SJRRP Mile Post 182.0) With-Project 399 17 2.3 2.3 2.5 2		Without-Project	382	16							457	19
182.0)	Dam (SJRRP	With-Project	399	17							474	20
Reach 5; Bear Creek Without-Project 497 19 532 22 Confluence (SJRRP Mile Post 135.8) With-Project 462 19 537 22 With-Project Value Change 0.9% 0.7√√		% Change	2.9	9%							2.3	3%
Confluence (SJRRP Mile Post 135.8) With-Project 462 19 537 22 0.7%	Reach 5; Bear		457	19							532	22
Post 135.8) % Change 0.9% 0.7%	Confluence	With-Project	462	19							537	22
		% Change	0.9	9%							0.7	7%

1,1 % Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 2-3. Count and Percent of Exceedence of the 7DADM Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – Normal-Dry Water Years

	Spring-run Chi	nook Salmo	n Tempera	ture Thresh	old Analysi			Normal-Dry	Water Year	Туре	
Lifes	stage	Adult M	igration	Spav	vning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period		nid July (822)		g - Oct (456)		g - Mar (1362)	Jan - Total (Dec (2190)		May (906)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	192	8	474	20	15	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	29	1	260	11	0	0	0	0
Post 267.6)	% Change	0.0	0%	-35	.7%	-15	.7%	-0.	7%	0.0	0%
Upstream Reach 1B:	Without-Project	414	17	456	19	817	34	1222	51	144	6
Highway 99 (SJRRP Mile	With-Project	344	14	456	19	1034	43	1132	47	80	3
Post 243.1)	% Change	-8.	5%	0.0	0%	15	.9%	-4.	1%	-7.	1%
Upstream Reach 2A;	Without-Project	431	18					1269	53	161	7
Gravelly Ford (SJRRP Mile	With-Project	418	17					1305	54	148	6
Post 229.0)	% Change	-1.	6%					1.6	6%	-1.	4%
Upstream Reach 2B;	Without-Project	482	20							212	9
Chowchilla Bypass	With-Project	533	22							263	11
(SJRRP Mile Post 216.0)	% Change	6.2	2%							5.0	6%
Upstream Reach 3;	Without-Project	587	24							317	13
Mendota Dam (SJRRP Mile	With-Project	607	25							337	14
Post 204.6)	% Change	2.4	1%							2.2	2%
Upstream Reach 4; Sack	Without-Project	607	25							337	14
Dam (SJRRP Mile Post	With-Project	621	26							351	15
182.0)	% Change	1.7	7%							1.9	5%
Upstream Reach 5; Bear	Without-Project	686	29							426	18
Creek Confluence	With-Project	695	29							428	18
(SJRRP Mile Post 135.8) Notes:	% Change	1.1	1%							0.2	2%

1.) % Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-run Chi	nook Salmo	n Tempera	ture Thresh	nold Analysi	s Current C	onditions-	Normal-Dry	Water Year	Туре	
Lifes	stage	Adult M	igration	Spav	vning	Incubat	ion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		o C	16	° C	18	° C
Total Day	s In Period	Feb 20 - Total	Mid June (696)		- Nov (546)	Sep Total	- Jan (918)	Jan - Total (Dec (2190)		- Jun (900)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	372	16	474	20	15	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	85	4	260	11	0	0	0	0
Post 267.6)	% Change	0.0%		-52.6%		-23	.3%	-0.	7%	0.0	0%
Upstream Reach 1B;	Without-Project	234	10	546	23	661	28	1222	51	324	14
Highway 99 (SJRRP Mile	With-Project	164	7	537	22	654	27	1132	47	254	11
Post 243.1) % Change		-10	.1%	-1.	6%	-0.	8%	-4.	1%	-7.	8%
Upstream Reach 2A;	Without-Project	251	10					1269	53	341	14
Gravelly Ford (SJRRP Mile	With-Project	238	10					1305	54	328	14
Post 229.0)	% Change	-1.	9%					1.0	6%	328 14 -1.4% 392 10	4%
Upstream Reach 2B;	Without-Project	302	13							392	16
Chowchilla Bypass	With-Project	353	15							443	18
(SJRRP Mile Post 216.0)	% Change	7.3	3%							5.7	7%
Upstream Reach 3;	Without-Project	407	17							497	21
Mendota Dam (SJRRP Mile	With-Project	427	18							517	22
Post 204.6)	% Change	2.9	9%							2.2	2%
Upstream Reach 4; Sack	Without-Project	427	18							517	22
Dam (SJRRP Mile Post	With-Project	441	18							531	22
182.0)	% Change	2.0	0%							1.0	6%
Upstream Reach 5; Bear	Without-Project	516	22							606	25
Creek Confluence	With-Project	518	22							608	25
(SJRRP Mile Post 135.8) Notes:	% Change	0.3	3%							0.2	2%

1,1 % Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 2-4. Count and Percent of Exceedence of the 7DADM Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – Normal-Wet Water Years

	Spring-run Chir	nook Salmo	n Tempera	ture Thresh	old Analysi	s Current C	onditions- I	Normal-Wet	Water Year	т Туре	
Lifes	stage		igration		vning	Incuba	tion and gence		Rearing		Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period		nid July		ıg - Oct		g - Mar		Dec		May
		Total	(685)	Total	(349)	Total	(1046)	Total		Total	(758)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	114	5	307	13	4	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	115	5	349	15	0	0	0	0
Post 267.6)	% Change	0.0	0%	0.3	3%	4.	0%	-0.	2%	0.0	0%
Upstream Reach 1B;	Without-Project	328	14	349	15	605	25	915	38	103	4
Highway 99 (SJRRP Mile	With-Project	294	12	349	15	920	38	907	38	83	3
Post 243.1)	% Change	-5.	0%	0.0	0%	30	.1%	-0.	5%	-2.	6%
Upstream Reach 2A:	Without-Project	346	14					950	40	121	5
Gravelly Ford (SJRRP Mile	With-Project	356	15					996	42	131	5
Post 229.0)	% Change	1.5	5%					2.0	6%	1.3	3%
Upstream Reach 2B;	Without-Project	358	15							133	6
Chowchilla Bypass	With-Project	407	17							182	8
(SJRRP Mile Post 216.0)	% Change	7.2	2%							6.	5%
Upstream Reach 3:	Without-Project	364	15							139	6
Mendota Dam (SJRRP Mile	With-Project	409	17							184	8
Post 204.6)	% Change	6.6	6%							5.9	9%
Upstream Reach 4; Sack	Without-Project	395	16							170	7
Dam (SJRRP Mile Post	With-Project	473	20							248	10
182.0)	% Change	11.	4%							10.	.3%
Upstream Reach 5; Bear	Without-Project	589	25							364	15
Creek Confluence	With-Project	598	25							373	16
(SJRRP Mile Post 135.8) Notes:	% Change	1.3%								1.:	2%

	Spring-run Chir	nook Salmo	n Temperat	ure Thresh	old Analysi	s Current C	onditions- I	Normal-Wet	Water Year	Type	
Lifes			igration		wning	Incubat	ion and		Rearing		Migration
	shold		· C		°C		gence ° C		° C		° C
	s In Period		Mid June		- Nov		- Jan		Dec		- Jun
Total Days	s iii i eilou	Total		Total	(394)	Total		Total	(1736)	Total	(753)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	234	10	307	13	4	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	193	8	349	15	0	0	0	0
`	% Change	0.0	0%	-10	.4%	6.2	2%	-0.	2%	0.0	0%
Upstream Reach 1B;	Without-Project	178	7	394	16	494	21	915	38	253	11
Highway 99 (SJRRP Mile	With-Project	144	6	390	16	560	23	907	38	219	9
Post 243.1)	% Change	-5.	8%	-1.	0%	9.8	3%	-0.	5%	-4.	5%
Upstream Reach 2A;	Without-Project	196	8					950	40	271	11
Gravelly Ford (SJRRP Mile	With-Project	206	9					996	42	281	12
Post 229.0)	% Change	1.7	7%					2.0	6%	1.3	3%
Upstream Reach 2B;	Without-Project	208	9							283	12
Chowchilla Bypass	With-Project	257	11							332	14
(SJRRP Mile Post 216.0)	% Change	8.4	1%							6.9	5%
Upstream Reach 3;	Without-Project	214	9							289	12
Mendota Dam (SJRRP Mile	With-Project	259	11							334	14
Post 204.6)	% Change	7.7	7%							6.0	0%
Upstream Reach 4; Sack	Without-Project	245	10							320	13
Dam (SJRRP Mile Post	With-Project	323	13							398	17
182.0)	% Change	13.	4%							10.	4%
Upstream Reach 5; Bear	Without-Project	439	18							514	21
Creek Confluence	With-Project	448	19							523	22
(SJRRP Mile Post 135.8)	% Change	1.5	5%							1.3	2%

^{1,1 %} Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 2-5. Count and Percent of Exceedence of the 7DADM Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – Wet Water Years

	Spring-run	Chinook Sa	ilmon Temp	erature Th	reshold Ana			ns- Wet Wa	ter Year Ty	Эе	
Lifes	stage	Adult M	igration	Spav	vning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	°C	13	O.	13	°C	16	° C	18	° C
Total Day	s In Period		nid July		ıg - Oct		g - Mar		Dec	Jan - May	
Total Day	5 III I CIIOG	Total		Total	(608)	Total	(1811)	Total		Total	(1203)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	256	11	653	27	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	152	6	507	21	0	0	0	0
Post 267.6)	% Change	0.0	0%	-17	.1%	-8.	1%	0.0	0%	0.0	0%
Upstream Reach 1B:	Without-Project	74	3	608	25	1021	43	1054	44	0	0
Highway 99 (SJRRP Mile	With-Project	110	5	608	25	1345	56	1191	50	29	1
Post 243.1)	% Change	3.3	3%	0.0	0%	17.	.9%	4.7	7%	2.	4%
Upstream Reach 2A;	Without-Project	111	5					1269	53	4	0
Gravelly Ford (SJRRP Mile	With-Project	349	15					1753	73	211	9
Post 229.0)	% Change	21.	7%					16.	6%	17.	2%
Upstream Reach 2B;	Without-Project	234	10							38	2
Chowchilla Bypass	With-Project	544	23							253	11
(SJRRP Mile Post 216.0)	% Change	28.	3%							17.	9%
Upstream Reach 3;	Without-Project	346	14							70	3
Mendota Dam (SJRRP Mile	With-Project	607	25							256	11
Post 204.6)	% Change	23.	8%							15.	5%
Upstream Reach 4; Sack	Without-Project	455	19							123	5
Dam (SJRRP Mile Post	With-Project	718	30							359	15
182.0)	% Change	24.	0%							19.	6%
Upstream Reach 5; Bear	Without-Project	759	32							399	17
Creek Confluence	With-Project	816	34							456	19
(SJRRP Mile Post 135.8) % Change 5.2%									4.	7%	

	Spring-run	Chinook Sa	Imon Temp	erature Th	reshold Ana	lysis Curre	nt Condition	ns- Wet Wa	ter Year Ty	pe	
Lifes	stage		igration		wning	Incubat	ion and		Rearing		Migration
Thre	shold	18	° C	13	° C		gence ° C	16	° C	18	° C
Total Day	s In Period		Mid June		- Nov		- Jan		Dec		- Jun
<u> </u>	rent	Total Count	(929) Average Annual	Total	(728) Average Annual	Total (Average Annual	Total (2915) Average Annual	Total ((1201) Average Annual
	1		Count		Count		Count		Count		Count
Upstream Reach 1A:	Without-Project	0	0	451	19	608	25	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	310	13	507	21	0	0	0	0
Post 267.6)	% Change	0.0	0%	-19	.4%	-8.	3%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	0	0	728	30	893	37	1054	44	12	1
Highway 99 (SJRRP Mile	With-Project	29	1	726	30	912	38	1191	50	29	1
Post 243.1)	% Change	3.1	1%	-0.	3%	1.6	6%	4.7	7%	1.4	4%
Upstream Reach 2A;	Without-Project	15	1					1269	53	42	2
Gravelly Ford	With-Project	229	10					1753	73	264	11
(SJRRP Mile Post 229.0)	% Change	23.	0%					16.	6%	18.	5%
Upstream Reach 2B;	Without-Project	86	4				·			152	6
Chowchilla Bypass	With-Project	341	14							439	18
(SJRRP Mile Post 216.0)	% Change	27.	4%							23.	9%
Upstream Reach 3;	Without-Project	142	6							233	10
Mendota Dam (SJRRP Mile	With-Project	374	16							488	20
Post 204.6)	% Change	25.	0%							21.	2%
Upstream Reach 4; Sack	Without-Project	220	9							338	14
Dam (SJRRP Mile Post	With-Project	479	20							599	25
182.0)	% Change	27.	9%							21.	7%
Upstream Reach 5; Bear	Without-Project	519	22							639	27
Creek Confluence	With-Project	576	24							696	29
(SJRRP Mile Post 135.8) Notes:	% Change	6.1	1%							4.7	7%

^{1,1 %} Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 2-6. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – All Water Years

	Fall-ru	n Chinook	Salmon Ten	nperature T	hreshold Ar	nalysis Curi	rent Conditi	ons - All Ye	ar Types		
Life	stage	Adult M	ligration	Spav	wning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	eshold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period		- Nov		- Dec		- Mar		May		May
-	rrent	Count	2,123) Average Annual Count	Count	2,116) Average Annual Count	Count	4,276) Average Annual Count	Count	3,624) Average Annual Count	Count	3,624) Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	1609	67	1609	67	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	1008	42	1115	46	0	0	0	0
Post 267.6)	% Change	0.0	0%	-28	.4%	-11	.6%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	1350	56	1808	75	2032	85	549	23	441	18
Highway 99 (SJRRP Mile	With-Project	1220	51	1714	71	3030	126	659	27	355	15
Post 243.1)	% Change	-6.	1%	-4.	4%	23.	.3%	3.0	0%	-2.	4%
Upstream Reach 2A;	Without-Project	1526	64					669	28	525	22
Gravelly Ford (SJRRP Mile	With-Project	1503	63					1280	53	722	30
Post 229.0)	% Change	-1.	1%					16.	.9%	5.4	4%
Upstream Reach 2B;	Without-Project	1645	69							667	28
Chowchilla Bypass	With-Project	1619	67							985	41
(SJRRP Mile Post 216.0)	% Change	-1.	2%							8.8	3%
Upstream Reach 3:	Without-Project	1432	60							813	34
Mendota Dam (SJRRP Mile	With-Project	1456	61							1079	45
Post 204.6)	% Change	1.1	1%							7.3	3%
Upstream	Without-Project	1490	62							937	39
Reach 4; Sack Dam (SJRRP Mile Post	With-Project	1523	63							1282	53
182.0)	% Change	1.0	6%							9.5	5%
Upstream Reach 5; Bear	Without-Project	1556	65							1571	65
Creek Confluence	With-Project	1563	65							1644	69
(SJRRP Mile Post 135.8)	% Change	0.3	3%							2.0	0%
Notes:											

Table 2-7. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – Dry Water Years

	Fall-run C	chinook Sal	mon Tempe	rature Thre	shold Anal			s- Dry Wate	r Year Type	•	
Lifes	stage		ligration	Spav	vning		ion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C	13'	°C	16	° C	18	°C
Total Day	s In Period		- Nov		Dec		Mar		May		May
			(455) Average		(460) Average		(912) Average		(757) Average		(757) Average
Cur	rent	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count
Upstream Reach 1A;	Without-Project	0	0	336	14	336	14	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	84	4	96	4	0	0	0	0
Post 267.6)	% Change	0.0	0%	-54	.8%	-26	.3%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	306	13	378	16	444	19	246	10	194	8
Highway 99 (SJRRP Mile	With-Project	244	10	318	13	586	24	247	10	163	7
Post 243.1)	% Change	-13	.6%	-13	.0%	15.	6%	0.4	1%	-4.	1%
Upstream Reach 2A:	Without-Project	342	14					282	12	239	10
Gravelly Ford (SJRRP Mile	With-Project	321	13					309	13	232	10
Post 229.0)	% Change	-4.	6%					3.6	6%	-0.	9%
Upstream Reach 2B;	Without-Project	358	15							284	12
Chowchilla Bypass	With-Project	344	14							287	12
(SJRRP Mile Post 216.0)	% Change	-3.	1%							0.4	4%
Upstream Reach 3;	Without-Project	320	13							287	12
Mendota Dam (SJRRP Mile	With-Project	318	13							302	13
Post 204.6)	% Change	-0.	4%							2.0	0%
Upstream Reach 4; Sack	Without-Project	332	14							307	13
Dam (SJRRP Mile Post	With-Project	333	14							324	14
182.0)	% Change	0.2	2%							2.:	2%
Upstream Reach 5; Bear	Without-Project	340	14							382	16
Creek Confluence	With-Project	340	14							387	16
(SJRRP Mile Post 135.8)	% Change	0.0	0%							0.	7%

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 2-8. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – Normal-Dry Water Years

	Fall-run Chine	ook Salmon	Temperatu	re Thresho	old Analysis	Current Co	nditions- N	ormal-Dry V	Vater Year	Туре	
Lifes	stage	Adult M	ligration	Spav	wning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period		- Nov (546)		- Dec (552)		- Mar (1092)		May (906)		May (906)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	457	19	457	19	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	231	10	260	11	0	0	0	0
Post 267.6)	% Change	0.0	0%	-40	.9%	-18	.0%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	342	14	468	20	547	23	165	7	144	6
Highway 99 (SJRRP Mile	With-Project	301	13	435	18	764	32	173	7	80	3
Post 243.1)	% Change	-7.	5%	-6.	0%	19.	.9%	0.9	9%	-7.	1%
Upstream Reach 2A;	Without-Project	401	17					204	9	161	7
Gravelly Ford (SJRRP Mile	With-Project	377	16					311	13	148	6
Post 229.0)	% Change	-4.	4%					11.	8%	-1.	4%
Upstream Reach 2B;	Without-Project	433	18							212	9
Chowchilla Bypass	With-Project	416	17							263	11
(SJRRP Mile Post 216.0)	% Change	-3.	1%							5.0	6%
Upstream Reach 3:	Without-Project	368	15							317	13
Mendota Dam (SJRRP Mile	With-Project	362	15							337	14
Post 204.6)	% Change	-1.	1%							2.:	2%
Upstream	Without-Project	384	16							337	14
Reach 4; Sack Dam (SJRRP	With-Project	383	16							351	15
Mile Post 182.0)	% Change	-0.	2%							1.5	5%
Upstream Reach 5; Bear	Without-Project	393	16							426	18
Creek Confluence	With-Project	393	16							428	18
(SJRRP Mile Post 135.8)	% Change	0.0	0%							0.:	2%
Notes:											

Table 2-9. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – Normal-Wet Water Years

	Fall-run Chine	ook Salmon	Temperatu	re Thresho	ld Analysis	Current Co	nditions- No	ormal-Wet \	Nater Year	Туре	
Lifes	stage	Adult M	ligration	Spav	wning		tion and	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		gence ° C	16	° C	18	° C
	s In Period	Sep -	- Nov		- Dec		- Mar	Jan -	May		May
Total Days	s III Fellou	Total	(394)	Total	(368)	Total	(821)	Total	(758)	Total	(758)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	298	12	298	12	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	238	10	296	12	0	0	0	0
Post 267.6)	% Change	0.0	0%	-16	.3%	-0.	2%	0.0	0%	0.0	0%
Upstream Reach 1B:	Without-Project	257	11	317	13	380	16	126	5	103	4
Highway 99 (SJRRP Mile	With-Project	246	10	328	14	695	29	153	6	83	3
Post 243.1)	% Change	-2.	8%	3.0	0%	38.	4%	3.0	6%	-2.	.6%
Upstream Reach 2A;	Without-Project	282	12					138	6	121	5
Gravelly Ford (SJRRP Mile	With-Project	276	12					215	9	131	5
Post 229.0)	% Change	-1.	5%					10.	2%	1.3	3%
Upstream Reach 2B;	Without-Project	301	13							133	6
Chowchilla Bypass	With-Project	296	12							182	8
(SJRRP Mile Post 216.0)	% Change	-1.	3%							6.9	5%
Upstream Reach 3;	Without-Project	268	11							139	6
Mendota Dam (SJRRP Mile	With-Project	266	11							184	8
Post 204.6)	% Change	-0.	5%							5.9	9%
Upstream Reach 4; Sack	Without-Project	275	11							170	7
Dam (SJRRP Mile Post	With-Project	275	11							248	10
182.0)	% Change	0.0	0%							10.	.3%
Upstream Reach 5; Bear	Without-Project	283	12							364	15
Creek Confluence	With-Project	282	12							373	16
(SJRRP Mile Post 135.8)	% Change	-0.	3%							1.3	2%
Notes:				Colored Decis							

Table 2-10. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project Current Conditions – Wet Water Years

	Fall-run C	hinook Salı	non Tempe	rature Thre	shold Analy	sis Curren	Conditions	- Wet Wate	er Year Type	•	
Lifes	stage		igration		vning	Incubat	ion and		Rearing		Migration
Thre	shold	18	, C	13	° C		gence ° C	16	° C	18	° C
Total Days	s In Period	Sep Total	- Nov		Dec (736)	Oct - Total	Mar		May (1203)		May (1203)
Cur	rent	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	518	22	518	22	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	455	19	463	19	0	0	0	0
Post 267.6)	% Change	0.0	0%	-8.	6%	-3.	8%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	445	19	645	27	661	28	12	1	0	0
Highway 99 (SJRRP Mile	With-Project	429	18	633	26	985	41	86	4	29	1
Post 243.1)	% Change	-2.	2%	-1.	6%	22.	3%	6.:	2%	2.	4%
Upstream Reach 2A;	Without-Project	501	21					45	2	4	0
Gravelly Ford (SJRRP Mile	With-Project	529	22					445	19	211	9
Post 229.0)	% Change	3.8	3%					33.	.3%	17.	2%
Upstream Reach 2B;	Without-Project	553	23							38	2
Chowchilla Bypass	With-Project	563	23							253	11
(SJRRP Mile Post 216.0)	% Change	1.4	1%							17.	9%
Upstream Reach 3;	Without-Project	476	20							70	3
Mendota Dam (SJRRP Mile	With-Project	510	21							256	11
Post 204.6)	% Change	4.7	7%							15.	5%
Upstream Reach 4; Sack	Without-Project	499	21							123	5
Dam (SJRRP Mile Post	With-Project	532	22							359	15
182.0)	% Change	4.5	5%							19.	6%
Upstream Reach 5; Bear	Without-Project	540	23							399	17
Creek Confluence	With-Project	548	23							456	19
(SJRRP Mile Post 135.8) Notes:	% Change	1.1	1%							4.	7%

EXHIBIT 3 TEMPERATURE THRESHOLD **ANALYSIS - 2030 CONDITIONS**

Note: A decrease in the number of days above the threshold for the with-project condition compared to the without-project is considered a temperature improvement.

Table 3-1. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions - All Water Years

Lifestage			-run Chino	ok Salmon		e Threshold	Analysis 2	2030 Conditi	ons - All Ye	ar Types		
Threshold 18° C 13° C	Life	stage	Adult M	ligration	Spav	wning			Juvenile	Rearing	Juvenile	Migration
Total Days In Period Mar-mid July mid-Aug - Oct Mid-Aug - Oct Total 1,783 (Total 5,356) (Total 3,688) (Total 3	Thre	eshold	18	° C	13	° C			16	° C	18	° C
Court Average Annual Court Average Annual Court Average Annual Court Court Average Annual Court Court Average Annual Court Court			Mar- n	nid July	_	-						_
Lipstream Reach 14; Friant Dam (SJRRP Mile Project Nather) Count Nather)	Total Day	s in Period	(Total		(Total		(Total		(Total		(Total	
Reach 1A, Friend Dam With-Project With-Project O O O O O O O O O	20	030	Count	Annual	Count	Annual	Count	Annual	Count	Annual	Count	Annual
Friant Dam		Without-Project	0	0	564	24	1604	67	47	2	0	0
Post 267.6 % Change	Friant Dam	With-Project	0	0	74	3	638	27	0	0	0	0
Reach 1B: Highway 99 (SJRRP Mile Post 243.1) With-Project 1058 44 1793 75 4075 170 4192 175 275 11 Upstream Reach 2A; Gravelly Ford (SJRRP Mile Post 229.0) Without-Project 1195 50 4814 201 299 12 Without-Project 1365 57 5033 210 531 22 Upstream Reach 2B; Chowchilla Bypass (SJRRP Mile Post 204.6) Without-Project 1800 75 780 33 Upstream Reach 3; Mendota Dam (SJRRP Mile Post 204.6) Without-Project 1840 77 780 33 Upstream Reach 4; Sack Dam (SJRRP Mile Post 204.6) Without-Project 2090 87 1033 43 Upstream Reach 4; Sack Dam (SJRRP Mile Post 182.0) Without-Project 2292 96 1223 51 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) 0.5% 119 1811 75 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) 2852 119 1833 76 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8)		% Change	0.0	0%	-27	.3%	-18	.0%	-0.	5%	0.0	0%
Highway 99 (SJRRP Mile Project 1058		Without-Project	630	26	1793	75	3247	135	4273	178	39	2
Post 243.1) % Change 13.0% 0.0% 15.5% -0.9% 6.5%	Highway 99	With-Project	1058	44	1793	75	4075	170	4192	175	275	11
Reach 2A; Gravelly Foriging		% Change	13.	.0%	0.0	0%	15	.5%	-0.	9%	6.9	5%
Gravelly Ford (SJRRP Mile Project (SJRRP Mile Post 229.0) 6.4 m/s Upstream Reach 2B; Chowchilla Bypass (SJRRP Mile Post 216.0) With-Project 1800 75 Upstream Reach 2B; Chowchilla Bypass (SJRRP Mile Post 216.0) With-Project 2090 87 Upstream Reach 4; Sack Dam (SJRRP Mile Post 204.6) With-Project 2090 87 Upstream Reach 4; Sack Dam (SJRRP Mile Post 204.6) With-Project 2090 87 Upstream Reach 4; Sack Dam (SJRRP Mile Post 204.6) With-Project 2090 85 Upstream Reach 4; Sack Dam (SJRRP Mile Post 182.0) Without-Project 2090 96 With-Project 182.0) Without-Project 2090 96 With-Project 2090 87 Without-Project 2090 85 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 138.0) Without-Project 2090 96 With-Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 138.0) Without-Project 2852 119 With-Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 138.0) With-Upstream 2852 119 Kochange 0.5% With-Upstream 2852 119 With-Upstream 2852 119 With-Upstream 2852 119 With-Upstream 28		Without-Project	1195	50					4814	201	299	12
Post 229.0 % Change 5.2% 2.5% 6.4%	Gravelly Ford	With-Project	1365	57					5033	210	531	22
Reach 2B; Chowchilla Bypass (SJRRP Mile Post 216.0) 1840 77 864 36 Upstream Reach 3; Mendota Dam (SJRRP Mile Post 204.6) With-Project 2090 87 1033 43 Upstream Reach 4; Sack Dam (SJRRP Mile Post 204.6) With-Project 2048 85 990 41 Upstream Reach 4; Sack Dam (SJRRP Mile Post 182.0) Without-Project 2099 96 1223 51 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 2852 119 1811 75 Upstream (SJRRP Mile Post 135.8) Without-Project 2873 120 1833 76		% Change	5.2	2%					2.	5%	6.4	4%
Bypass (SJRRP Mile Project 1840 77 864 36 36 36 36 36 36 36		Without-Project	1800	75							780	33
Post 216.0 % Change 1.2% 2.3%		With-Project	1840	77							864	36
Reach 3; Mendota Dan (SJRRP Mile Post 204.6) With-Project 2048 85 990 41 Upstream (Reach 4; Sack Dam (SJRRP) Mile Post 182.0) With-Project 2292 96 1223 51 Upstream (Reach 4; Sack Dam (SJRRP) Mile Post 182.0) With-Project 2309 96 1248 52 Upstream (Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 2852 119 1811 75 Upstream (SJRRP) Mile Project 2873 120 1833 76 Upstream (SJRRP) Mile Project 267 0.6% 0.6%		% Change	1.:	2%							2.3	3%
Mendota Dam (SJRRP Mile Project (SJRRP Mile Post 204.6) With-Project 2292 96 1.23% 51 Upstream Reach 4; Sack Dam (SJRRP Mile Post 182.0) Without-Project 2309 96 1223 51 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) Without-Project 2852 119 1811 75 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) With-Project 2873 120 1833 76 With 2, Ray Mile Post 135.8) % Change 0.6% 0.6% 0.6%		Without-Project	2090	87							1033	43
Post 204.6 % Change -1.3%	Mendota Dam	With-Project	2048	85							990	41
Reach 4; Sack Dam (SJRRP Mith-Project 2309 96 1248 52 182.0		% Change	-1.	3%							-1.	2%
Dam (SJRRP Mile Post 138.0) With-Project 2309 96 1248 52 Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 135.8) With-Project 2852 119 1811 75 KJRRP Mile Post 135.8) With-Project 2873 120 1833 76		Without-Project	2292	96							1223	51
182.0) % Change 0.5% Upstream Reach 5; Bear Creek Confluence (SJRRP Mile Post 13c.8) 2852 119 (SJRRP Mile Post 13c.8) 2873 120 (SJRRP Mile Post 13c.8) 0.6%	Dam (SJRRP	With-Project	2309	96							1248	52
Reach 5; Bear Creek Without-Project 2852 119 1811 75 Confluence (SJRRP Mile Post 135.8) With-Project 2873 120 1833 76 Whith-Project (SJRP) Change 0.6% 0.6%		% Change	0.9	5%							0.7	7%
Confluence (SJRRP Mile Post 135.8) With-Project 2873 120 1833 76 User (SJRRP Mile Post 135.8) % Change 0.6% 0.6%	Reach 5; Bear	Without-Project	2852	119							1811	75
Post 135.8) % Change 0.6% 0.6%	Confluence	With-Project	2873	120							1833	76
	Post 135.8)	% Change	0.0	6%							0.0	6%

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring	-run Chino	ok Salmon	Temperatur	e Threshold	Analysis 2	030 Conditi	ons - All Ye	ar Types		
Lifes	stage	Adult M	igration	Spar	wning		ion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	°C	13	° C		° C	16	° C	18	° C
Total Day	s In Period	Feb 20 - (Total			-Nov 2,123)		-Jan 3,574)	Jan - (Total	Dec 8,668)		- Jun 3,606)
20)30	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	1203	50	1574	66	47	2	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	263	11	638	27	0	0	0	0
Post 267.6)	% Change	0.0	0%	-44	.3%	-26	.2%	-0.	5%	0.0	0%
Upstream Reach 1B;	Without-Project	134	6	2123	88	2593	108	4273	178	314	13
Highway 99 (SJRRP Mile	With-Project	492	21	2081	87	2644	110	4192	175	732	31
Post 243.1)	% Change	12.	8%	-2.	0%	1.4	1%	-0.	9%	11.	6%
Upstream Reach 2A;	Without-Project	537	22					4814	201	857	36
Gravelly Ford (SJRRP Mile	With-Project	766	32					5033	210	1033	43
Post 229.0)	% Change	8.3	2%					2.5	5%	4.9	9%
Upstream Reach 2B;	Without-Project	1104	46							1449	60
Chowchilla Bypass	With-Project	1168	49							1503	63
(SJRRP Mile Post 216.0)	% Change	2.3	3%							1.9	5%
Upstream Reach 3;	Without-Project	1378	57							1731	72
Mendota Dam (SJRRP Mile	With-Project	1334	56							1688	70
Post 204.6)	% Change	-1.	6%							-1.	2%
Upstream Reach 4; Sack	Without-Project	1579	66							1939	81
Dam (SJRRP Mile Post	With-Project	1606	67							1966	82
182.0)	% Change	1.0	0%							0.7	7%
Upstream Reach 5; Bear	Without-Project	2170	90							2531	105
Creek Confluence	With-Project	2192	91							2553	106
(SJRRP Mile Post 135.8)	% Change	0.8	3%							0.0	6%

^{1,1 %} Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 3-2. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions – Dry Water Years

vvitir i rojec											
	Without-Project 0 0 0 100 4 0 0							r Year Type	9		
	_				_	Emer	gence		ŭ		Migration ° C
Thre	shold				_						
Total Day	s In Period										May (757)
20)30		Average Annual		Average Annual		Average Annual		Average Annual	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	82	3	303	13	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	0	0	100	4	0	0	0	0
Post 267.6)	% Change	0.0	0%	-21	.6%	-17	.9%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	222	9	380	16	734	31	1033	43	31	1
Highway 99 (SJRRP Mile	With-Project	341	14	380	16	822	34	1026	43	129	5
Post 243.1)	% Change	17.	4%	0.0	0%	7.	7%	-0.	4%	12.	.9%
Upstream Reach 2A;	Without-Project	391	16					1179	49	170	7
Gravelly Ford (SJRRP Mile	With-Project	441	18					1144	48	216	9
Post 229.0)	% Change	7.3	3%					-1.	9%	6.	1%
Upstream Reach 2B;	Without-Project	565	24							341	14
Chowchilla Bypass	With-Project	521	22							300	13
(SJRRP Mile Post 216.0)	% Change	-6.	4%							-5.	4%
Upstream Reach 3;	Without-Project	575	24							350	15
Mendota Dam (SJRRP Mile	With-Project	544	23							319	13
Post 204.6)	% Change	-4.	5%							-4.	1%
Upstream Reach 4; Sack	Without-Project	601	25							377	16
Dam (SJRRP Mile Post	With-Project	569	24							345	14
182.0)	% Change	-4.	7%							-4.	2%
Upstream Reach 5; Bear	Without-Project	660	28							438	18
Creek Confluence	With-Project	660	28							438	18
(SJRRP Mile Post 135.8)	% Change	0.0	0%							0.0	0%

Notes:
1.) % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-ru	n Chinook	Salmon Ten	nperature T	hreshold A	nalysis 203	0 Condition	s- Dry Wate	r Year Type		
Life	stage		igration	·	wning	Incubat	tion and		Rearing		Migration
	shold		· C		° C		gence ° C	16	° C		° C
	s In Period	Feb 20 -	Mid June	Sep	- Nov	Sep	- Jan	Jan -	- Dec	Feb	- Jun
-	30	Total	(582) Average Annual	Total Count	(455) Average Annual	Total Count	(765) Average Annual	Total	(1827) Average Annual	Total Count	(752) Average Annual
20	J30	Couri	Count	Count	Count	Count	Count	Count	Count	Count	Count
Upstream Reach 1A;	Without-Project	0	0	232	10	303	13	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	38	2	100	4	0	0	0	0
Post 267.6)	% Change	0.0	0%	-42	.6%	-26	.5%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	81	3	455	19	548	23	1033	43	147	6
Highway 99 (SJRRP Mile	With-Project	191	8	439	18	513	21	1026	43	266	11
Post 243.1)	% Change	18.	9%	-3.	.5%	-4.	6%	-0.	4%	15.	.8%
Upstream Reach 2A;	Without-Project	241	10					1179	49	316	13
Gravelly Ford (SJRRP Mile	With-Project	291	12					1144	48	366	15
Post 229.0)	% Change	8.0	6%					-1.	9%	6.0	6%
Upstream Reach 2B;	Without-Project	416	17							491	20
Chowchilla Bypass	With-Project	375	16							450	19
(SJRRP Mile Post 216.0)	% Change	-7.	0%							-5.	5%
Upstream Reach 3;	Without-Project	425	18							500	21
Mendota Dam (SJRRP Mile	With-Project	394	16							469	20
Post 204.6)	% Change	-5.	3%							-4.	1%
Upstream Reach 4; Sack	Without-Project	452	19							527	22
Dam (SJRRP Mile Post	With-Project	420	18							495	21
182.0)	% Change	-5.	5%							-4.	3%
Upstream Reach 5; Bear	Without-Project	513	21							588	25
Creek Confluence	With-Project	513	21							588	25
(SJRRP Mile Post 135.8)	% Change	0.0)%							0.	0%
Notes:											

^{1,1 %} Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 3-3. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions – Normal-Dry Water Years

vviai i iojec	Spring-run Ch						nditions- N	ormal-Dry V	Vator Voar		
Lifes	stage		igration		vning		tion and		Rearing		Migration
	shold		° C		° C		gence ° C		° C		° C
			nid July		g - Oct		g - Mar		Dec		May
Total Day	s In Period	Total	(822)	Total	(456)	Total	(1362)	Total	(2190)		(906)
20)30	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	139	6	419	17	19	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	22	1	180	8	0	0	0	0
Post 267.6)	% Change	0.0	0%	-25	.7%	-17	.5%	-0.	9%	0.0	0%
Upstream Reach 1B:	Without-Project	190	8	456	19	856	36	1158	48	8	0
Highway 99 (SJRRP Mile	With-Project	355	15	456	19	1081	45	1152	48	85	4
Post 243.1)	% Change	20.	1%	0.0	0%	16.	.5%	-0.	3%	8.9	5%
Upstream Reach 2A:	Without-Project	353	15					1320	55	85	4
Gravelly Ford	With-Project	432	18					1355	56	162	7
(SJRRP Mile Post 229.0)	% Change	9.6	6%					1.0	6%	8.9	5%
Upstream Reach 2B;	Without-Project	558	23							293	12
Chowchilla Bypass	With-Project	567	24							314	13
(SJRRP Mile Post 216.0)	% Change	1.1	1%							2.3	3%
Upstream Reach 3:	Without-Project	632	26							362	15
Mendota Dam (SJRRP Mile	With-Project	628	26							358	15
Post 204.6)	% Change	-0.	5%							-0.	4%
Upstream Reach 4; Sack	Without-Project	673	28							409	17
Dam (SJRRP Mile Post	With-Project	667	28							406	17
182.0)	% Change	-0.	7%							-0.	3%
Upstream Reach 5; Bear	Without-Project	751	31							510	21
Creek Confluence (SJRRP Mile	With-Project	751	31							510	21
Post 135.8) Notes:	% Change	0.0	0%							0.0	0%

Notes:
1, % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	0	Jan a a la O a la	T	-t There	- I I.I. A I	-1- 0000 0-	and distance At		V-1 V 7		
	Spring-run Cl	ninook Sain	non Temper	ature Thre	shold Analy		ion and			уре	
	stage		igration		wning	Emer	gence		Rearing		Migration
Thre	shold		°C		°C		°C		° C		° C
Total Day	s In Period		Mid June (696)		- Nov (546)	Sep Total	- Jan (918)	Jan - Total (Dec (2190)	Feb Total	- Jun (900)
20)30	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	319	13	419	17	19	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	52	2	180	8	0	0	0	0
Post 267.6)	% Change	0.0	0%	-48	.9%	-26	.0%	-0.	9%	0.0	0%
Upstream Reach 1B;	Without-Project	36	2	546	23	673	28	1158	48	101	4
Highway 99 (SJRRP Mile	With-Project	175	7	536	22	683	28	1152	48	265	11
Post 243.1)	% Change	20.	0%	-1.	8%	1.1	1%	-0.	3%	18.	2%
Upstream Reach 2A;	Without-Project	173	7					1320	55	263	11
Gravelly Ford (SJRRP Mile	With-Project	252	11					1355	56	342	14
Post 229.0)	% Change	11.	4%					1.0	6%	8.8	3%
Post 229.0) o	Without-Project	383	16							473	20
Bypass	With-Project	404	17							494	21
(SJRRP Mile Post 216.0)	% Change	3.0	0%							2.3	3%
Upstream Reach 3;	Without-Project	452	19							542	23
Mendota Dam (SJRRP Mile	With-Project	448	19							538	22
Post 204.6)	% Change	-0.	6%							-0.	4%
Upstream Reach 4; Sack	Without-Project	499	21							589	25
Dam (SJRRP Mile Post	With-Project	496	21							586	24
182.0)	% Change	-0.	4%							-0.	3%
Upstream Reach 5; Bear	Without-Project	599	25							690	29
Creek Confluence	reek 599 25							690	29		
(SJRRP Mile Post 135.8)	% Change	0.0	0%							0.0	0%

Table 3-4. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions – Normal-Wet Water Years

vviai i iojec							nditions N	armal Wat I	Motor Voor	Type	
1.16	Without-Project 126 5 349 15 649 27 852 36 858										
	_				_				ŭ		Migration ° C
					_			-	_		· May
Total Day	s in Period		(685)		(349)		(1046)		(1736)		(758)
20	030	Count	Annual	Count	Annual	Count	Annual	Count	Annual	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	109	5	294	12	5	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	0	0	69	3	0	0	0	0
Post 267.6)	% Change	0.0	0%	-31	.2%	-21	.5%	-0.	3%	0.0	0%
Upstream Reach 1B;	Without-Project	126	5	349	15	649	27	852	36	0	0
Highway 99 (SJRRP Mile	With-Project	255	11	349	15	904	38	858	36	40	2
Post 243.1)	% Change	18.	8%	0.0	0%	24	.4%	0.3	3%	5.:	3%
Upstream Reach 2A;	Without-Project	246	10					932	39	33	1
Gravelly Ford (SJRRP Mile	With-Project	296	12					1026	43	73	3
Post 229.0)	% Change	7.3	3%					5.4	1 %	5.3	3%
Upstream Reach 2B;	Without-Project	333	14							110	5
Chowchilla Bypass	With-Project	379	16							154	6
(SJRRP Mile Post 216.0)	% Change	6.7	7%							5.	8%
Upstream Reach 3;	Without-Project	418	17							193	8
Mendota Dam (SJRRP Mile	With-Project	419	17							194	8
Post 204.6)	% Change	0.1	1%							0.	1%
Upstream Reach 4; Sack	Without-Project	469	20							244	10
Dam (SJRRP Mile Post	With-Project	502	21							277	12
182.0)	% Change	4.8	3%							4.4	4%
Upstream Reach 5; Bear	Without-Project	634	26							416	17
Creek Confluence	With-Project	636	27							419	17
(SJRRP Mile Post 135.8)	% Change	0.3	3%							0.4	4%

Notes:
1.) % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-run Ch	ninook Salm	on Temper	ature Thres	shold Analys	sis 2030 Co	nditions- No	ormal-Wet \	Nater Year	Туре	
Lifes	stage	Adult M	igration	Spav	vning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period	Feb 20 - Total	Mid June (583)		- Nov (394)	Sep Total	- Jan (673)	Jan - Total	Dec (1736)		- Jun (753)
20)30	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	229	10	294	12	5	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	0	0	69	3	0	0	0	0
Post 267.6)	% Change	0.0	0%	-58	.1%	-33	.4%	-0.	3%	0.0	0%
Upstream Reach 1B;	Without-Project	17	1	394	16	491	20	852	36	51	2
Highway 99 (SJRRP Mile	With-Project	105	4	383	16	543	23	858	36	180	8
Post 243.1)	% Change	15.	1%	-2.	8%	7.7	7%	0.3	3%	17.	.1%
Upstream Reach 2A;	Without-Project	96	4					932	39	171	7
Gravelly Ford (SJRRP Mile	With-Project	146	6					1026	43	221	9
Post 229.0)	% Change	8.6	6%					5.4	1%	6.0	6%
Upstream Reach 2B;	Without-Project	183	8							258	11
Chowchilla Bypass	With-Project	229	10							304	13
(SJRRP Mile Post 216.0)	% Change	7.9	9%							6.	1%
Upstream Reach 3;	Without-Project	268	11							343	14
Mendota Dam (SJRRP Mile	With-Project	269	11							344	14
Post 204.6)	% Change	0.2	2%							0.	1%
Upstream Reach 4; Sack	Without-Project	319	13							394	16
Dam (SJRRP Mile Post	With-Project	352	15							427	18
182.0)	% Change	5.7	7%							4.4	4%
Upstream Reach 5; Bear	Without-Project	491	20							566	24
Creek Confluence	Creek 494 21 With-Project							569	24		
(SJRRP Mile Post 135.8) Notes:	% Change	0.5	5%							0.4	4%

^{1,1 %} Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 3-5. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions - Wet Water Years

vvitir i rojec	t 2030 Cond					alvsis 2030	Conditions	- Wet Wate	r Year Type		
Lifes	stage		igration		vning	Incubat	tion and		Rearing		Migration
	shold		° C		, C		gence ° C		° C	18	
Total Day	s In Period		nid July		g - Oct	mid-Au	g - Mar	Jan -	Dec		May
Total Bay	5 III 7 GIIGG	Total ((1096) Average	Total	(608) Average	Total	(1811) Average	Total	(2915) Average	Total	(1203) Average
20	30	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count
Upstream Reach 1A;	Without-Project	0	0	234	10	588	25	23	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	52	2	289	12	0	0	0	0
Post 267.6)	% Change	0.0)%	-29	.9%	-16	.5%	-0.	8%	0.0)%
Upstream Reach 1B:	Without-Project	92	4	608	25	1008	42	1230	51	0	0
Highway 99 (SJRRP Mile	With-Project	107	4	608	25	1268	53	1156	48	21	1
Post 243.1)	% Change	1.4	1%	0.0	0%	14.	.4%	-2.	5%	1.7	7%
Upstream Reach 2A:	Without-Project	205	9					1383	58	11	0
Gravelly Ford (SJRRP Mile	With-Project	196	8					1508	63	18 Jan Total age all rit of the state of the	3
Post 229.0)	% Change	-0.	8%					4.3	3%	5.7	7%
Upstream Reach 2B;	Without-Project	344	14							36	2
Chowchilla Bypass	With-Project	373	16							96	4
(SJRRP Mile Post 216.0)	% Change	2.6	6%							5.0)%
Upstream Reach 3:	Without-Project	465	19							128	5
Mendota Dam (SJRRP Mile	With-Project	457	19							119	5
Post 204.6)	% Change	-0.	7%							-0.	7%
Upstream Reach 4; Sack	Without-Project	549	23							193	8
Dam (SJRRP Mile Post	With-Project	571	24							220	9
182.0)	% Change	2.0	0%							2.2	2%
Upstream Reach 5; Bear	Without-Project	807	34							447	19
Creek Confluence (SJRRP Mile	With-Project	826	34							466	19
Post 135.8)	% Change	1.7	7%							1.0	6%

Notes:
1, % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-ru	n Chinook	Salmon Ten	nperature T	hreshold Ar	nalvsis 2030	Conditions	- Wet Wate	r Year Type	•	
Lifes	stage		ligration	·	wning	Incubat	ion and		Rearing		Migration
	shold		° C		° C		gence ° C		° C		, C
	s In Period		Mid June	Sep	- Nov		- Jan		Dec		- Jun
Total Day.	s III i ellou	Total	(929)	Total	(728)	Total	(1218)	Total		Total	1201)
20)30	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	423	18	558	23	23	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	173	7	289	12	0	0	0	0
Post 267.6)	% Change	0.0	0%	-34	.3%	-22	.1%	-0.	8%	0.0)%
Upstream Reach 1B;	Without-Project	0	0	728	30	881	37	1230	51	15	1
Highway 99 (SJRRP Mile	With-Project	21	1	723	30	905	38	1156	48	21	1
Post 243.1)	% Change	2.:	3%	-0.	7%	2.0	0%	-2.	5%	0.9	5%
Upstream Reach 2A;	Without-Project	27	1					1383	58	107	4
Gravelly Ford (SJRRP Mile	With-Project	77	3					1508	63	104	4
Post 229.0)	% Change	5.4	4%					4.3	3%	-0.	2%
Upstream	Without-Project	122	5							227	9
Chowchilla Bypass	With-Project	160	7							255	11
(SJRRP Mile Post 216.0)	% Change	4.	1%							2.3	3%
Upstream Reach 3;	Without-Project	233	10							346	14
Mendota Dam (SJRRP Mile	With-Project	223	9							337	14
Post 204.6)	% Change	-1.	1%							-0.	7%
Upstream Reach 4; Sack	Without-Project	309	13							429	18
Dam (SJRRP Mile Post	With-Project	338	14							458	19
182.0)	% Change	3.	1%							2.4	1%
Upstream Reach 5; Bear	Without-Project	567	24							687	29
Creek Confluence	With-Project	586	24							706	29
(SJRRP Mile Post 135.8)	% Change	2.0	0%							1.0	5%

Table 3-6. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions - All Water Years

ge pld period ithout-Project ith-Project Change ithout-Project ith-Project	Adult M 188 Sep (Total Count 0 0 1465	P C - Nov 2,123) Average Annual Count 0	13 Oct	vning ° C Dec 2,116) Average Annual Count 63	Emer 13' Oct -	ion and gence C C Mar 4,276) Average Annual	Juvenile 16° Jan - (Total Count	May 3,624) Average	,	°C
n Period ithout-Project ith-Project Change ithout-Project	Sep (Total Count 0 0	- Nov 2,123) Average Annual Count 0	Oct (Total Count	Dec 2,116) Average Annual Count	13' Oct - (Total	Mar 4,276) Average Annual	Jan - (Total	May 3,624) Average	Jan - (Total	May 3,624)
ithout-Project ith-Project Change ithout-Project	(Total Count 0 0.0	2,123) Average Annual Count 0	(Total Count 1508	2,116) Average Annual Count	(Total	4,276) Average Annual	(Total	3,624) Average	(Total	3,624)
ithout-Project ith-Project Change ithout-Project	Count 0 0.0	Average Annual Count 0	Count	Average Annual Count	,	Average Annual	, i	Average	,	
ith-Project Change ithout-Project	0	0		63		Count		Annual Count	Count	Annual Count
Change ithout-Project	0.0		539		1508	63	0	0	0	0
ithout-Project		0%		22	623	26	0	0	0	0
	1465		-45	.8%	-20	.7%	0.0)%	0.0)%
ith-Project		61	1774	74	2167	90	339	14	39	2
	1259	52	1692	71	2995	125	581	24	275	11
Change	-9.	7%	-3.	9%	19.	4%	6.7	7%	6.5	5%
ithout-Project	1622	68					704	29	299	12
ith-Project	1541	64					1120	47	531	22
Change	-3.	8%					11.	5%	6.4	1%
ithout-Project	1718	72							780	33
ith-Project	1668	70							864	36
Change	-2.	4%							2.3	3%
ithout-Project	1555	65							1033	43
ith-Project	1558	65							990	41
Change	0.1	1%							-1.	2%
ithout-Project	1615	67							1223	51
ith-Project	1616	67							1248	52
Change	0.0	0%							0.7	7%
ithout-Project	1668	70							1811	75
ith-Project	1668	70							1833	76
	0.0)%								
ith C ith C ith C ith ith C	nout-Project hange	1622 1622 1622 1623 1624 1224	1622 68 68 64 64 64 64 64 64	1622 68 1624 164	nange nout-Project 1622 68 Project 1541 64 Project 1718 72 Project 1668 70 Project 1555 65 Project 1558 65 Project 1615 67 Project 1616 67 Project 1616 67 Project 1668 70 Project 1668 70 Project 1668 70	nange nout-Project 1622 68 Project 1541 64 Project 1718 72 Project 1668 70 Project 1555 65 Project 1558 65 Project 1615 67 Project 1616 67 Project 1668 70 Project 1668 70	nange 1622 68 p-Project 1541 64 p-Project 1541 64 p-Project 1718 72 p-Project 1668 70 p-Project 1555 65 p-Project 1558 65 p-Project 1616 67 p-Project 1616 67 p-Project 1616 67 p-Project 1668 70	1622 68 704 1120 112	1622 68 704 29 1120 47 115%	1622 68 704 29 299 -Project 1541 64 1120 47 531 -Project 1718 72 780 -Project 1668 70 864 -Project 1555 65 1033 -Project 1558 65 990 -Project 1615 67 1223 -Project 1616 67 1248 -Project 1668 70 1811 -Project 1616 67 1248 -Project 1616 70 1811 -Project 1668 70 1811 -Project 1668 70 1811

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 3-7. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions – Dry Water Years

With-Projec	t 2030 Con					lveie 2030	Conditions-	Dry Water	Voor Type		
Lifes	stage		igration		vning	Incubat	tion and		Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period		- Nov		Dec		- Mar		May		May
20)30	Total Count	Average Annual Count	Count	(460) Average Annual Count	Count	(912) Average Annual Count	Count	(757) Average Annual Count	Total Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	303	13	303	13	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	88	4	100	4	0	0	0	0
Post 267.6)	% Change	0.0	0%	-46	.7%	-22	.3%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	330	14	376	16	509	21	176	7	31	1
Highway 99 (SJRRP Mile	With-Project	273	11	331	14	597	25	226	9	129	5
Post 243.1)	% Change	-12	.5%	-9.	8%	9.0	6%	6.0	6%	12.	9%
Upstream Reach 2A;	Without-Project	356	15					309	13	170	7
Gravelly Ford (SJRRP Mile	With-Project	335	14					301	13	216	9
Post 229.0)	% Change	-4.	6%					-1.	1%	6.	1%
Upstream Reach 2B;	Without-Project	372	16							341	14
Chowchilla Bypass	With-Project	362	15							300	13
(SJRRP Mile Post 216.0)	% Change	-2.	2%							-5.	4%
Upstream	Without-Project	348	15							350	15
Reach 3; Mendota Dam (SJRRP Mile	With-Project	347	14							319	13
Post 204.6)	% Change	-0.	2%							-4.	1%
Upstream	Without-Project	356	15							377	16
Reach 4; Sack Dam (SJRRP	With-Project	357	15							345	14
Mile Post 182.0)	% Change	0.2	2%							-4.	2%
Upstream Reach 5; Bear	Without-Project	362	15							438	18
Creek Confluence	With-Project	362	15							438	18
(SJRRP Mile Post 135.8)	% Change	0.0	0%							0.0	0%
Votes:											

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 3-8. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions – Normal-Dry Water Years

With-Projec	t 2030 Cone Fall-run Chi						ditions No.	mal Day W	tor Voca T		
1 160	stage		igration		vning		tion and		Rearing		Migration
	shold		° C		° C		gence ° C		° C		° C
			- Nov		· Dec		- Mar		May		May
Total Day	s In Period		(546)		(552)		(1092)		(906)		(906)
20	030	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	417	17	417	17	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	154	6	180	8	0	0	0	0
Post 267.6)	% Change	0.0	0%	-47	.6%	-21	.7%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	379	16	466	19	586	24	103	4	8	0
Highway 99 (SJRRP Mile	With-Project	315	13	440	18	811	34	186	8	85	4
Post 243.1)	% Change	-11.	.7%	-4.	7%	20	.6%	9.2	2%	8.9	5%
Upstream Reach 2A;	Without-Project	423	18					245	10	85	4
Gravelly Ford (SJRRP Mile	With-Project	394	16					345	14	162	7
Post 229.0)	% Change	-5.	3%					11.	0%	8.9	5%
Upstream Reach 2B;	Without-Project	453	19							293	12
Chowchilla Bypass	With-Project	431	18							314	13
(SJRRP Mile Post 216.0)	% Change	-4.	0%							2.3	3%
Upstream Reach 3:	Without-Project	414	17							362	15
Mendota Dam (SJRRP Mile	With-Project	415	17							358	15
Post 204.6)	% Change	0.2	2%							-0.	4%
Upstream Reach 4; Sack	Without-Project	427	18							409	17
Dam (SJRRP Mile Post	With-Project	426	18							406	17
182.0)	% Change	-0.	2%							-0.	3%
Upstream Reach 5; Bear	Without-Project	431	18							510	21
Creek Confluence	With-Project	431	18							510	21
(SJRRP Mile Post 135.8)	% Change	0.0	0%							0.0	0%
Notes:											

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 3-9. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions – Normal-Wet Water Years

With-Projec	t 2030 Cone Fall-run Chi						ditions No.				
Lifes	stage		igration		vning	Incuba	tion and		Rearing		Migration
Thre	shold	18	° C	13	° C		gence ° C	16	° C	18	° C
Total Day	s In Period		- Nov		Dec		Mar		May		May
		Total	(394) Average	Total	(368) Average	Total	(821) Average	Total	(758) Average	Total	(758) Average
20	030	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count
Upstream Reach 1A;	Without-Project	0	0	290	12	290	12	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	26	1	69	3	0	0	0	0
Post 267.6)	% Change	0.0	0%	-71	.7%	-26	.9%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	272	11	309	13	424	18	47	2	0	0
Highway 99 (SJRRP Mile	With-Project	252	11	312	13	679	28	102	4	40	2
Post 243.1)	% Change	-5.	1%	0.8	8%	31	1%	7.3	3%	5.3	3%
Upstream Reach 2A;	Without-Project	303	13					108	5	33	1
Gravelly Ford (SJRRP Mile	With-Project	287	12					228	10	73	3
Post 229.0)	% Change	-4.	1%					15.	8%	5.3	3%
Upstream Reach 2B;	Without-Project	323	13							110	5
Chowchilla Bypass	With-Project	308	13							154	6
(SJRRP Mile Post 216.0)	% Change	-3.	8%							5.8	3%
Upstream	Without-Project	282	12							193	8
Reach 3; Mendota Dam (SJRRP Mile	With-Project	278	12							194	8
Post 204.6)	% Change	-1.	0%							0.1	1%
Upstream	Without-Project	292	12							244	10
Reach 4; Sack Dam (SJRRP	With-Project	291	12							277	12
Mile Post 182.0)	% Change	-0.	3%							4.4	1%
Upstream Reach 5; Bear	Without-Project	294	12							416	17
Creek Confluence	With-Project	294	12							419	17
(SJRRP Mile Post 135.8)	% Change	0.0)%							0.4	4%
Notes:											

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 3-10. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2030 Conditions – Wet Water Years

/vitn-Projec	t 2030 Cone Fall-run					lysis 2030	Conditions-	Wet Water	Year Type		
Lifes	stage		igration		wning	Incubat	tion and gence		Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period		- Nov (728)		Dec (736)		Mar (1451)		May (1203)		May (1203)
20	030	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	498	21	498	21	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	271	11	274	11	0	0	0	0
Post 267.6)	% Change	0.0	0%	-30	.8%	-15	.4%	0.0	0%	0.0	0%
Upstream Reach 1B:	Without-Project	484	20	623	26	648	27	13	1	0	0
Highway 99 (SJRRP Mile	With-Project	419	17	609	25	908	38	67	3	21	1
Post 243.1)	% Change	-8.	9%	-1.	9%	17.	.9%	4.	5%	1.	7%
Upstream Reach 2A:	Without-Project	540	23					42	2	11	0
Gravelly Ford (SJRRP Mile	With-Project	525	22					246	10	80	3
Post 229.0)	% Change	-2.	1%					17.	.0%	5.	7%
Upstream Reach 2B;	Without-Project	570	24							36	2
Chowchilla Bypass	With-Project	567	24							96	4
(SJRRP Mile Post 216.0)	% Change	-0.	4%							5.0	0%
Upstream Reach 3:	Without-Project	511	21							128	5
Mendota Dam (SJRRP Mile	With-Project	518	22							119	5
Post 204.6)	% Change	1.0	0%							-0.	.7%
Upstream Reach 4; Sack	Without-Project	540	23							193	8
Dam (SJRRP Mile Post	With-Project	542	23							220	9
182.0)	% Change	0.3	3%							2.:	2%
Upstream Reach 5; Bear	Without-Project	581	24							447	19
Creek Confluence	With-Project	581	24							466	19
(SJRRP Mile Post 135.8)	% Change	0.0	0%							1.0	6%
Votes:	alculated as the n		6 11	Colored Deels							

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

EXHIBIT 4 TEMPERATURE THRESHOLD **ANALYSIS - 2070 CONDITIONS**

Note: A decrease in the number of days above the threshold for the with-project condition compared to the without-project is considered a temperature improvement.

Table 4-1. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – All Water Years

vviai i rojec	Spring					Analysis 2	070 Conditi	ons - All Ye	ar Tynes		
Life	stage		ligration		wning	Incubat	tion and		Rearing	luvenile	Migration
	shold		° C		° C		gence		° C		° C
			nid July		ıq - Oct		° C q - Mar		Dec		May
Total Day	s In Period		3,288)		1,793)		5,356)		8,668)		3,619)
20	070	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	563	23	1648	69	174	7	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	66	3	556	23	41	2	0	0
Post 267.6)	% Change	0.0	0%	-27	.7%	-20	.4%	-1.	5%	0.0	0%
Upstream Reach 1B:	Without-Project	1358	57	1793	75	3447	144	4751	198	496	21
Highway 99 (SJRRP Mile	With-Project	1193	50	1793	75	4159	173	4420	184	389	16
Post 243.1)	% Change	-5.	0%	0.0	0%	13.	.3%	-3.	8%	-3.	0%
Upstream Reach 2A;	Without-Project	1575	66					5158	215	600	25
Gravelly Ford (SJRRP Mile	With-Project	1481	62					5296	221	581	24
Post 229.0)	% Change	-2.	9%					1.0	6%	-0.	5%
Upstream Reach 2B;	Without-Project	1914	80							898	37
Chowchilla Bypass	With-Project	2068	86							1095	46
(SJRRP Mile Post 216.0)	% Change	4.	7%							5.4	4%
Upstream Reach 3;	Without-Project	2163	90							1098	46
Mendota Dam (SJRRP Mile	With-Project	2251	94							1189	50
Post 204.6)	% Change	2.	7%							2.5	5%
Upstream Reach 4; Sack	Without-Project	2391	100							1355	56
Dam (SJRRP Mile Post	With-Project	2544	106							1513	63
182.0)	% Change	4.1	7%							4.4	4%
Upstream Reach 5; Bear	Without-Project	2977	124							1979	82
Creek Confluence	With-Project	3053	127							2056	86
(SJRRP Mile Post 135.8)	% Change	2.3	3%							2.	1%
Notes:											

1.) % Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

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	Spring	-run Chino	ok Salmon	Temperatur	e Threshold			ons - All Ye	ar Types		
Lifes	stage	Adult M	igration	Spav	wning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period	Feb 20 · (Total	mid Jun 2,790)		-Nov 2,123)		-Jan 3,574)		Dec 8,668)		- Jun 3,606)
20)70	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	1207	50	1628	68	174	7	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	197	8	556	23	41	2	0	0
Post 267.6)	% Change	0.0	0%	-47	.6%	-30	.0%	-1.	5%	0.0	0%
Upstream Reach 1B;	Without-Project	740	31	2123	88	2770	115	4751	198	1004	42
Highway 99 (SJRRP Mile	With-Project	622	26	2098	87	2805	117	4420	184	862	36
Post 243.1)	% Change	-4.	2%	-1.	2%	1.0	0%	-3.	8%	-3.	9%
Upstream Reach 2A;	Without-Project	880	37					5158	215	1218	51
Gravelly Ford (SJRRP Mile	With-Project	828	35					5296	221	1128	47
Post 229.0)	% Change	-1.	9%					1.0	6%	-2.	5%
Upstream Reach 2B;	Without-Project	1243	52							1589	66
Chowchilla Bypass	With-Project	1421	59							1777	74
(SJRRP Mile Post 216.0)	% Change	6.4	1%							5.2	2%
Upstream Reach 3;	Without-Project	1455	61							1815	76
Mendota Dam (SJRRP Mile	With-Project	1549	65							1909	80
Post 204.6)	% Change	3.4	1%							2.0	6%
Upstream Reach 4; Sack	Without-Project	1714	71							2075	86
Dam (SJRRP Mile Post	With-Project	1871	78							2233	93
182.0)	% Change	5.6	6%							4.4	4%
Upstream Reach 5; Bear	Without-Project	2324	97							2699	112
Creek Confluence	With-Project	2401	100							2776	116
(SJRRP Mile Post 135.8)	% Change	2.8	3%							2.	1%

^{1,1 %} Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 4-2. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – Dry Water Years

				ter Years		nalysis 207	0 Conditions	s- Dry Wate	r Year Tyne		
Lifes	stage		igration		vning		tion and		Rearing		Migration
	shold		° C		° C		gence ° C		° C		° C
			nid July		g - Oct		g - Mar	-	Dec		May
l otal Day	s In Period	Total		Total	(380)	Total	(1137)	Total		Total	(757)
20)70	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	120	5	351	15	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	0	0	70	3	0	0	0	0
Post 267.6)	% Change	0.0	0%	-31	.6%	-24	.7%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	448	19	380	16	750	31	1156	48	223	9
Highway 99 (SJRRP Mile	With-Project	419	17	380	16	926	39	1100	46	197	8
Post 243.1)	% Change	-4.	2%	0.0	0%	15.	.5%	-3.	1%	-3.	4%
Upstream Reach 2A;	Without-Project	486	20					1206	50	261	11
Gravelly Ford (SJRRP Mile	With-Project	476	20					1282	53	251	10
Post 229.0)	% Change	-1.	5%					4.2	2%	-1.	3%
Upstream Reach 2B;	Without-Project	528	22							310	13
Chowchilla Bypass	With-Project	581	24							372	16
(SJRRP Mile Post 216.0)	% Change	7.7	7%							8.2	2%
Upstream Reach 3;	Without-Project	554	23							330	14
Mendota Dam (SJRRP Mile	With-Project	585	24							362	15
Post 204.6)	% Change	4.5	5%							4.2	2%
Upstream Reach 4; Sack	Without-Project	612	26							393	16
Dam (SJRRP Mile Post	With-Project	631	26							412	17
182.0)	% Change	2.8	3%							2.5	5%
Upstream Reach 5; Bear	Without-Project	685	29							485	20
Creek Confluence	With-Project	685	29							485	20
(SJRRP Mile Post 135.8)	% Change	0.0	0.0%							0.0	0%

Notes:
1.) % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-ru	n Chinook	Salmon Ten	nnerature T	hreshold A	nalysis 2070	Condition	s- Dry Wate	r Year Type		
Lifor	stage		igration		wning		ion and		Rearing		Migration
	shold		•		° C		gence				° C
			° C Mid June		- Nov		° C - Jan		° C · Dec		- Jun
Total Day	s In Period		(582)		(455)	Total		Total			(752)
20	070	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A:	Without-Project	0	0	270	11	351	15	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	7	0	70	3	0	0	0	0
Post 267.6)	% Change	0.0	0%	-57	.8%	-36	.7%	0.0	0%	0.0	0%
Upstream Reach 1B;	Without-Project	298	12	455	19	580	24	1156	48	373	16
Highway 99 (SJRRP Mile	With-Project	269	11	443	18	560	23	1100	46	344	14
Post 243.1)	% Change	-5.	0%	-2.	6%	-2.	6%	-3.	1%	-3.	9%
Upstream Reach 2A;	Without-Project	336	14					1206	50	411	17
Gravelly Ford (SJRRP Mile	With-Project	326	14					1282	53	401	17
Post 229.0)	% Change	-1.	7%					4.2	2%	-1.	3%
Upstream Reach 2B;	Without-Project	385	16							460	19
Chowchilla Bypass	With-Project	445	19							522	22
(SJRRP Mile Post 216.0)	% Change	10.	3%							8.2	2%
Upstream Reach 3;	Without-Project	405	17							480	20
Mendota Dam (SJRRP Mile	With-Project	437	18							512	21
Post 204.6)	% Change	5.9	5%							4.3	3%
Upstream Reach 4; Sack	Without-Project	468	20							543	23
Dam (SJRRP Mile Post	With-Project	487	20							562	23
182.0)	% Change	3.3	3%							2.5	5%
Upstream Reach 5; Bear	Without-Project	555	23							635	26
Creek Confluence	With-Project	555	23							635	26
(SJRRP Mile Post 135.8)	% Change	0.0	0%							0.0	0%

^{1,1 %} Change calculated as the percent difference from Without-Project to With-Project

2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 4-3. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – Normal-Dry Water Years

vvitii-i Tojet	Spring-run Cl						nditions- N	ormal-Dry V	Vator Voar	Type	
Lifo	stage		igration		vning		tion and		Rearing		Migration
	shold		° C	·	° C		gence		ŭ		° C
			nid July		g - Oct		° C lg - Mar		° C Dec		May
Total Day	s In Period	Total	(822)	Total	(456)		(1362)		(2190)		(906)
20	070	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	148	6	432	18	30	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	8	0	174	7	0	0	0	0
Post 267.6)	% Change	0.0	0%	-30	.7%	-18	.9%	-1.	4%	0.0	0%
Upstream Reach 1B:	Without-Project	425	18	456	19	920	38	1287	54	155	6
Highway 99 (SJRRP Mile	With-Project	385	16	456	19	1192	50	1265	53	115	5
Post 243.1)	% Change	-4.	9%	0.0	0%	20	.0%	-1.	0%	-4.	4%
Upstream Reach 2A:	Without-Project	461	19					1399	58	191	8
Gravelly Ford (SJRRP Mile	With-Project	483	20					1511	63	215	9
Post 229.0)	% Change	2.7	7%					5.1	1%	2.0	6%
Upstream Reach 2B;	Without-Project	591	25							348	15
Chowchilla Bypass	With-Project	655	27							424	18
(SJRRP Mile Post 216.0)	% Change	7.8	3%							8.4	4%
Upstream Reach 3:	Without-Project	655	27							396	17
Mendota Dam (SJRRP Mile	With-Project	680	28							426	18
Post 204.6)	% Change	3.0	0%							3.3	3%
Upstream Reach 4; Sack	Without-Project	693	29							452	19
Dam (SJRRP Mile Post	With-Project	715	30							477	20
182.0)	% Change	2.7	7%							2.8	3%
Upstream Reach 5; Bear	Without-Project	792	33							565	24
Creek Confluence (SJRRP Mile	With-Project	794	33							567	24
Post 135.8) Notes:	% Change	0.2	2%							0.2	2%

Notes:
1, % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-run Cl	ninook Saln	non Temper	ature Thre	shold Analy			ormal-Dry \	Vater Year	Гуре	1
Lifes	stage	Adult N	ligration	Spar	wning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Davi	s In Period		Mid June		- Nov	Sep	- Jan	Jan -	- Dec		- Jun
Total Day.	s III i ellou	Total	(696)	Total	(546)	Total	(918)	Total	(2190)	Total	(900)
20	070	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	328	14	432	18	30	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	41	2	174	7	0	0	0	0
Post 267.6)	% Change	0.	0%	-52	.6%	-28	.1%	-1.	4%	0.0	0%
Upstream Reach 1B:	Without-Project	245	10	546	23	720	30	1287	54	335	14
Highway 99 (SJRRP Mile	With-Project	205	9	542	23	770	32	1265	53	295	12
Post 243.1)	% Change	-5.	7%	-0.	7%	5.4	4%	-1.	0%	-4.	4%
Upstream Reach 2A;	Without-Project	281	12					1399	58	371	15
Gravelly Ford (SJRRP Mile	With-Project	305	13					1511	63	395	16
Post 229.0)	% Change	3.	4%					5.	1%	2.	7%
Upstream Reach 2B;	Without-Project	437	18							528	22
Chowchilla Bypass	With-Project	508	21							604	25
(SJRRP Mile Post 216.0)	% Change	10.	.2%							8.	4%
Upstream Reach 3:	Without-Project	486	20							576	24
Mendota Dam (SJRRP Mile	With-Project	516	22							606	25
Post 204.6)	% Change	4.:	3%							3.3	3%
Upstream Reach 4; Sack	Without-Project	541	23							632	26
Dam (SJRRP Mile Post	With-Project	566	24							657	27
182.0)	% Change	3.	6%							2.	8%
Upstream Reach 5; Bear	Without-Project	650	27							745	31
Creek Confluence	With-Project	652	27							747	31
Post 135.8) Notes:	JRRP Mile									0.:	2%

Table 4-4. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – Normal-Wet Water Years

vviii i rojoc	Spring-run Ch				ter Years		nditions- No	ormal-Wet \		Type	
Lifes	stage		igration		vning	Incuba	tion and		Rearing		Migration
	shold		. C		, C		gence ° C		° C		° C
Total Day	s In Period		nid July		g - Oct	mid-Au	ıg - Mar	Jan -	Dec		May
Total Bay	o iii r onod	Total	(685) Average	Total	(349) Average	Total	(1046) Average	Total	(1736) Average	Total	(758) Average
20	70	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count	Count	Annual Count
Upstream Reach 1A;	Without-Project	0	0	111	5	304	13	23	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	0	0	128	5	0	0	0	0
Post 267.6)	% Change	0.0	0%	-31	.8%	-16	.8%	-1.	3%	0.0	0%
Upstream Reach 1B:	Without-Project	343	14	349	15	707	29	972	41	118	5
Highway 99 (SJRRP Mile	With-Project	298	12	349	15	907	38	907	38	77	3
Post 243.1)	% Change	-6.	6%	0.0	0%	19	.1%	-3.	7%	-5.	4%
Upstream Reach 2A:	Without-Project	355	15					1010	42	130	5
Gravelly Ford	With-Project	336	14					1055	44	113	5
(SJRRP Mile Post 229.0)	% Change	-2.	8%					2.0	6%	-2.	2%
Upstream Reach 2B;	Without-Project	379	16							155	6
Chowchilla Bypass	With-Project	418	17							206	9
(SJRRP Mile Post 216.0)	% Change	5.7	7%							6.7	7%
Upstream Reach 3:	Without-Project	435	18							210	9
Mendota Dam (SJRRP Mile	With-Project	465	19							240	10
Post 204.6)	% Change	4.4	1%							4.0	0%
Upstream Reach 4; Sack	Without-Project	506	21							290	12
Dam (SJRRP Mile Post	With-Project	557	23							343	14
182.0)	% Change	7.4	1%							7.0	0%
Upstream Reach 5; Bear	Without-Project	654	27							443	18
Creek Confluence (SJRRP Mile	With-Project	655	27							445	19
Post 135.8)	% Change	0.1	1%							0.3	3%

Notes:
1, % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-run Ch	ninook Saln	non Temper	ature Thres	shold Analys			ormal-Wet \	Vater Year	Гуре	1
Lifes	stage	Adult M	ligration	Spar	wning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	°C		° C	16	° C	18	° C
Total Day	s In Period		Mid June		- Nov		- Jan		Dec		- Jun
Total Day	5 III I CIIOG	Total	(583)	Total	(394)	Total	(673)	Total	(1736)	Total	(753)
20	070	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	231	10	304	13	23	1	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	31	1	128	5	0	0	0	0
Post 267.6)	% Change	0.	0%	-50	.8%	-26	.2%	-1.	3%	0.0	0%
Upstream Reach 1B:	Without-Project	193	8	394	16	529	22	972	41	268	11
Highway 99 (SJRRP Mile	With-Project	148	6	390	16	580	24	907	38	223	9
Post 243.1)	% Change	-7.	7%	-1.	0%	7.0	6%	-3.	7%	-6.	0%
Upstream Reach 2A;	Without-Project	205	9					1010	42	280	12
Gravelly Ford (SJRRP Mile	With-Project	186	8					1055	44	261	11
Post 229.0)	% Change	-3.	3%					2.0	6%	-2.	5%
Upstream Reach 2B;	Without-Project	230	10							305	13
Chowchilla Bypass	With-Project	278	12							356	15
(SJRRP Mile Post 216.0)	% Change	8.:	2%							6.	8%
Upstream Reach 3:	Without-Project	285	12							360	15
Mendota Dam (SJRRP Mile	With-Project	315	13							390	16
Post 204.6)	% Change	5.	1%							4.0	0%
Upstream Reach 4; Sack	Without-Project	365	15							440	18
Dam (SJRRP Mile Post	With-Project	417	17							493	21
182.0)	% Change	8.9	9%							7.0	0%
Upstream Reach 5; Bear	Without-Project	513	21							593	25
Creek Confluence	With-Project	515	21							595	25
(SJRRP Mile Post 135.8) Notes:	JRRP Mile									0.	3%

Table 4-5. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Spring-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions - Wet Water Years

/vitn-Projec	Spring-ru					alveis 207	0 Conditions	- Wot Wate	r Year Tyne		
l ifes	stage		igration		vning		tion and		Rearing		Migration
	shold		° C		° C		gence ° C		° C		° C
	s In Period		nid July	mid-Au	ıg - Oct		ıg - Mar		- Dec		May
Total Day	s III Fellou	Total (Total		Total	(1811)	Total	(2915)	Total	
20	070	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	184	8	561	23	121	5	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	58	2	184	8	41	2	0	0
Post 267.6)	% Change	0.0	0%	-20	.7%	-20	.8%	-2.	7%	0.0	0%
Upstream Reach 1B;	Without-Project	142	6	608	25	1070	45	1336	56	0	0
Highway 99 (SJRRP Mile	With-Project	91	4	608	25	1134	47	1148	48	0	0
Post 243.1)	% Change	-4.	7%	0.0	0%	3.	5%	-6.	4%	0.0	0%
Upstream Reach 2A;	Without-Project	273	11					1543	64	18	1
Gravelly Ford (SJRRP Mile	With-Project	186	8					1448	60	2	0
Post 229.0)	% Change	-7.	9%					-3.	3%	-1.	3%
Upstream Reach 2B;	Without-Project	416	17							85	4
Chowchilla Bypass	With-Project	414	17							93	4
(SJRRP Mile Post 216.0)	% Change	-0.	2%							0.7	7%
Upstream Reach 3;	Without-Project	519	22							162	7
Mendota Dam (SJRRP Mile	With-Project	521	22							161	7
Post 204.6)	% Change	0.2	2%							-0.	1%
Upstream Reach 4; Sack	Without-Project	580	24							220	9
Dam (SJRRP Mile Post	With-Project	641	27							281	12
182.0)	% Change	5.6	6%							5.1	1%
Upstream Reach 5; Bear	Without-Project	846	35							486	20
Creek Confluence		919	38							559	23
(SJRRP Mile	With-Project										

Notes:
1.) % Change calculated as the percent difference from Without-Project to With-Project
2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

	Spring-ru	n Chinook S	Salmon Ten	perature T	hreshold Ar		Conditions	s- Wet Wate	er Year Type	9	
Lifes	stage	Adult M	igration	Spar	vning		tion and gence	Juvenile	Rearing	Juvenile	Migration
Thre	shold	18	° C	13	° C		° C	16	° C	18	° C
Total Day	s In Period	Feb 20 - Total	Mid June (929)		- Nov (728)		- Jan (1218)		Dec (2915)	Feb Total	- Jun (1201)
20	070	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	378	16	541	23	121	5	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	118	5	184	8	41	2	0	0
Post 267.6)	% Change	0.0	0%	-35	.7%	-29	.3%	-2.	7%	0.0	0%
Upstream Reach 1B:	Without-Project	4	0	728	30	941	39	1336	56	28	1
Highway 99 (SJRRP Mile	With-Project	0	0	723	30	895	37	1148	48	0	0
Post 243.1)	% Change	-0.	4%	-0.	7%	-3.	8%	-6.	4%	-2.	3%
Upstream Reach 2A:	Without-Project	58	2					1543	64	156	7
Gravelly Ford (SJRRP Mile	With-Project	11	0					1448	60	71	3
Post 229.0)	% Change	-5.	1%					-3.	3%	-7.	1%
Upstream Reach 2B;	Without-Project	191	8							296	12
Chowchilla Bypass	With-Project	190	8							295	12
(SJRRP Mile Post 216.0)	% Change	-0.	1%							-0.	1%
Upstream Reach 3:	Without-Project	279	12							399	17
Mendota Dam (SJRRP Mile	With-Project	281	12							401	17
Post 204.6)	% Change	0.2	2%							0.2	2%
Upstream Reach 4; Sack	Without-Project	340	14							460	19
Dam (SJRRP Mile Post	With-Project	401	17							521	22
182.0)	% Change	6.0	6%							5.1	1%
Upstream Reach 5; Bear	Without-Project	606	25							726	30
Creek Confluence	With-Project	679	28							799	33
(SJRRP Mile Post 135.8) Notes:	% Change	7.9	9%							6.	1%

Table 4-6. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – All Water Years

With-Projec	t 2070 Con										
							70 Condition				
	stage		igration ° C		vning ° C	Emer	gence		Rearing	Juvenile 18	Migration
Threshold			- Nov		· Dec		° C · Mar		° C May		May
Total Days In Period			2,123)		2,116)		4,276)		3,624)		3,624)
2070		Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	1557	65	1557	65	4	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	411	17	529	22	0	0	0	0
Post 267.6)	% Change	0.0	0%	-54	.2%	-24	.0%	-0.1%		0.0%	
Upstream Reach 1B; Highway 99 (SJRRP Mile	Without-Project	1640	68	1824	76	2367	99	616	26	496	21
	With-Project	1420	59	1759	73	3079	128	684	29	389	16
Post 243.1)	% Change	-10	.4%	-3.1%		16	.7% 1.9%		9%	-3.	0%
Upstream Reach 2A;	Without-Project	1771	74					862	36	600	25
Gravelly Ford (SJRRP Mile	With-Project	1634	68					1220	51	581	24
Post 229.0)	% Change	-6.	5%					9.9	9%	-0.	5%
Upstream Reach 2B; W	Without-Project	1873	78							898	37
Chowchilla Bypass	With-Project	1775	74							1095	46
(SJRRP Mile Post 216.0)	% Change	-4.6%								5.4	1%
Upstream	Without-Project	1726	72							1098	46
Reach 3; Mendota Dam	With-Project	1741	73							1189	50
(SJRRP Mile Post 204.6)	% Change	0.7	7%							2.5	5%
Upstream	Without-Project	1797	75							1355	56
Reach 4; Sack Dam (SJRRP Mile Post	With-Project	1797	75							1513	63
182.0)	% Change	0.0	0%							4.4	1%
Upstream Reach 5; Bear	Without-Project	1849	77							1979	82
Creek Confluence	With-Project	1854	77							2056	86
(SJRRP Mile Post 135.8)	% Change	0.2	2%							2.	1%
Notes:											

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 4-7. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – Dry Water Years

igration F C Nov (455) Average Annual Count 0 0 15 13 8% 16 15	133 Oct - Total Count 334 46 -62 386 335	wring ° C - Dec (460) Average Annual Count 14 2 .6% 16 14	Emer 13' Oct - Total Count 334 70 -28 525 701	ion and gence 0 C 1 C 1 Mar (912) Average Annual Count 14 3 9% 22 29	Jan - Total Count 0 0 0.0 265 276	C C May (757) Average Annual Count 0 0 9% 11 12	Juvenile N 188 Jan - Total Count 0 0 0.0 223 197 -3.4	C C May (757) Average Annual Count 0 0	
Nov (455) Average Annual Count 0 0 15 13 8% 16 16	Oct Total Count 334 46 -62 386 335	- Dec (460) Average Annual Count 14 26% 16 14	13' Oct - Total Count 334 70 -28 525 701	© C Mar (912) Average Annual Count 14 3 9% 22 29	Jan- Total Count 0 0 0.0 265 276 1.5	May (757) Average Annual Count 0 0 19% 11	Jan - Total Count 0 0 0.0 223	May (757) Average Annual Count 0 0 9 8	
(455) Average Annual Count 0 0 0 3% 15 13 .8% 16 15	Total Count 334 46 -62 386 335	(460) Average Annual Count 14 2 .6% 16	Total Count 334 70 -28 525 701	(912) Average Annual Count 14 3 9% 22 29	Total Count 0 0 0.0.265 276	(757) Average Annual Count 0 0 19% 11	Total Count 0 0 0.0 223 197	(757) Average Annual Count 0 0 9 8	
Average Annual Count 0 0 0 3% 15 13 .8%	Count 334 46 -62 386 335	Average Annual Count 14 2 .6% 16	Count 334 70 -28 525 701	Average Annual Count 14 3 .9% 22	Count 0 0 0.0 265 276	Average Annual Count 0 0 0 11 12	Count 0 0 0.0 223 197	Average Annual Count 0 0 0	
0 0 15 13 .8% 16 15	46 -62 386 335	2 2.6% 16 14	70 -28 525 701	3 .9% 22 29	0 0.0 265 276	0 0% 11 12	0 0.0 223 197	9	
15 13 8% 16 15	-62 386 335	16	-28 525 701	. 9% 22 29	265 276	11 12	0.0 223 197	9 8	
15 13 8% 16 15	386 335	16 14	525 701	22 29	265 276	11 12	223 197	9	
13 .8% 16 .15	335	14	701	29	276 1.	12	197	8	
. 8% 16 15					1.0				
16 15	-11	.1%	19.	3%		5%	-3.4	1%	
15					300	1.5%		-3.4%	
					000	13	261	11	
5%					421	18	251	10	
					16.	0%	-1.3	3%	
17							310	13	
16							372	16	
1%							8.2	%	
16							330	14	
16							362	15	
7%							4.2	%	
16							393	16	
16							412	17	
4%							2.5	%	
16							485	20	
							485	20	
16							0.0	<u>~</u>	
	16 16 4%	16 16 4%	16 16 4% 16 16	16 16 4% 16 16	16 16 4% 16 16	16 16 4% 16 16	16 16 4% 16	16 393 412 4% 2.5 16 485	

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 4-8. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – Normal-Dry Water Years

with-Projec	t 2070 Con						ditions- Nor	mal-Dry W	ater Year Ty	/pe	
Lifes	stage		ligration		vning	Incuba	tion and		Rearing		Migration
Thre	shold	18	° C	13	° C		gence ° C	16	° C	18	° C
Total Days In Period			- Nov (546)		Dec (552)		- Mar (1092)	Jan - May Total (906)			May (906)
2070		Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	430	18	430	18	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	126	5	174	7	0	0	0	0
Post 267.6)	% Change	0.0	0%	-55.1%		-23	.4%	0.0%		0.0	0%
Highway 99	Without-Project	430	18	470	20	650	27	192	8	155	6
	With-Project	367	15	485	20	922	38	274	11	115	5
Post 243.1)	% Change	-11	.5%	2.	7%	24.9% 9.1%		1%	-4.	4%	
Upstream Reach 2A;	Without-Project	469	20					292	12	191	8
Gravelly Ford	With-Project	424	18					455	19	215	9
Post 229.0)	% Change	-8.	2%					18.	.0%	2.0	6%
Upstream	Without-Project	499	21							348	15
Chowchilla Bypass	With-Project	470	20							424	18
(SJRRP Mile Post 216.0)	% Change	-5.3%								8.	4%
Upstream	Without-Project	458	19							396	17
Reach 3; Mendota Dam	With-Project	453	19							426	18
(SJRRP Mile Post 204.6)	% Change	-0.	9%							3.3	3%
Upstream	Without-Project	474	20							452	19
Reach 4; Sack Dam (SJRRP	With-Project	471	20							477	20
Mile Post 182.0)	% Change	-0.	5%							2.5	3%
Upstream Reach 5; Bear	Without-Project	493	21							565	24
Creek Confluence	With-Project	490	20							567	24
(SJRRP Mile Post 135.8)	% Change	-0.	5%							0.:	2%
Notes:											

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 4-9. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – Normal-Wet Water Years

with-Projec	Fall-run Chi						ditions- Nor	mal-Wet W	ater Year T		,
Lifes	stage		ligration		wning	Incuba	tion and		Rearing		Migration
Thre	shold	18	° C	13	° C		gence ° C	16	° C	18	° C
Total Days In Period			- Nov		- Dec	Oct - Mar Total (821)		Jan - May Total (758)			May
2070		Count	(394) Average Annual Count	Count	(368) Average Annual Count	Count	Average Annual Count	Count	Average Annual Count	Count	(758) Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	296	12	296	12	4	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	87	4	128	5	0	0	0	0
Post 267.6)	% Change	0.0	0%	-56.8%		-20	.5%	-0.5%		0.0%	
Highway 99 (SJRRP Mile	Without-Project	306	13	317	13	482	20	136	6	118	5
	With-Project	271	11	330	14	682	28	132	6	77	3
Post 243.1) % Change		-8.	9%	3.9	5%	24	.4%	-0.5%		-5.	4%
Upstream Reach 2A;	Without-Project	329	14					166	7	130	5
Gravelly Ford (SJRRP Mile	With-Project	307	13					245	10	113	5
Post 229.0)	% Change	-5.	6%					10.	4%	-2.	2%
Upstream Reach 2B;	Without-Project	348	15							155	6
Chowchilla Bypass	With-Project	331	14							206	9
(SJRRP Mile Post 216.0)	% Change	-4.3%								6.	7%
Upstream Reach 3:	Without-Project	320	13							210	9
Mendota Dam (SJRRP Mile	With-Project	316	13							240	10
Post 204.6)	% Change	-1.	0%							4.0	0%
Upstream	Without-Project	331	14							290	12
Reach 4; Sack Dam (SJRRP Mile Post	With-Project	326	14							343	14
182.0)	% Change	-1.	3%							7.0	0%
Upstream Reach 5; Bear	Without-Project	337	14							443	18
Creek Confluence	With-Project	335	14							445	19
(SJRRP Mile Post 135.8)	% Change	-0.	5%							0.:	3%
Notes:											

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

Table 4-10. Count and Percent of Exceedence of the 7-Day Average Daily Maximum (7DADM) Water Temperature Units for Fall-Run Chinook Salmon for Without-Project and the Percent Change from the With-Project 2070 Conditions – Wet Water Years

vvitii-i Tojet	t 2070 Con					lveie 2070	Conditions-	Wet Water	Year Tyne		-
Lifestage			igration		wning	Incubat	tion and gence		Rearing	Juvenile	Migration
Threshold		18	° C	13° C		13° C		16° C		18° C	
Total Days In Period			- Nov		- Dec		- Mar		May		May
2070		Total Count	Average Annual Count	Count	(736) Average Annual Count	Count	(1451) Average Annual Count	Total	Average Annual Count	Count	(1203) Average Annual Count
Upstream Reach 1A;	Without-Project	0	0	497	21	497	21	0	0	0	0
Friant Dam (SJRRP Mile	With-Project	0	0	152	6	157	7	0	0	0	0
Post 267.6)	% Change	0.0	0%	-46.9%		-23	.4%	0.0%		0.0	0%
Upstream Reach 1B;	Without-Project	538	22	651	27	710	30	23	1	0	0
Highway 99 (SJRRP Mile	With-Project	465	19	609	25	774	32	2	0	0	0
Post 243.1)	% Change	-10.0%		-5.7%		4.4	4%	-1.	7%	0.0	0%
Upstream	Without-Project	581	24					104	4	18	1
Reach 2A; Gravelly Ford (SJRRP Mile	With-Project	545	23					99	4	2	0
Post 229.0)	% Change	-4.	9%					-0.	4%	-1.	3%
Chowchilla Bypass With	Without-Project	625	26				·			85	4
	With-Project	587	24							93	4
(SJRRP Mile Post 216.0)	% Change	-5.	2%							0.7	7%
Upstream	Without-Project	568	24							162	7
Reach 3; Mendota Dam (SJRRP Mile	With-Project	595	25							161	7
Post 204.6)	% Change	3.7	7%							-0.	1%
Upstream	Without-Project	604	25							220	9
Reach 4; Sack Dam (SJRRP	With-Project	614	26							281	12
Mile Post 182.0)	% Change	1.4	1%							5.	1%
Upstream Reach 5; Bear	Without-Project	627	26							486	20
Creek Confluence	With-Project	638	27							559	23
(SJRRP Mile			5%							6.	1%

^{1.) %} Change calculated as the percent difference from Without-Project to With-Project 2.) Formula: (With-Project Count / Total Days in Period) - (Without-Project Count / Total Days in Period)

EXHIBIT 5 TEMPERATURE EXCEEDENCE ANALYSIS - CURRENT CONDITIONS

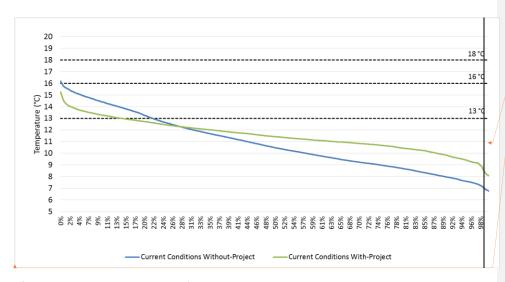


Figure 5-1. Percent Exceedence of the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for Without-Project Conditions and With-Project Conditions Under Current Conditions for all Water Years – At Head of Reach 1A (Friant Dam) for the 1980 to 2003 Water Year Simulation Period

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EXHIBIT 6 TEMPERATURE EXCEEDENCE ANALYSIS - 2030 CONDITIONS

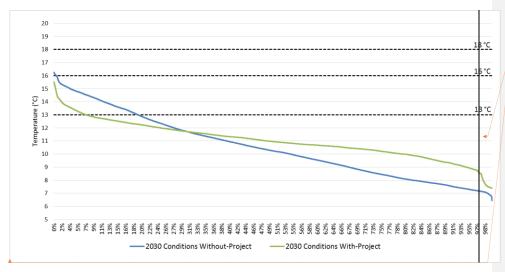


Figure 6-1. Percent Exceedence of the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for Without-Project Conditions and With-Project Conditions Under 2030 Conditions for all Water Years – At Head of Reach 1A (Friant Dam)

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EXHIBIT 7 TEMPERATURE EXCEEDENCE ANALYSIS - 2070 CONDITIONS



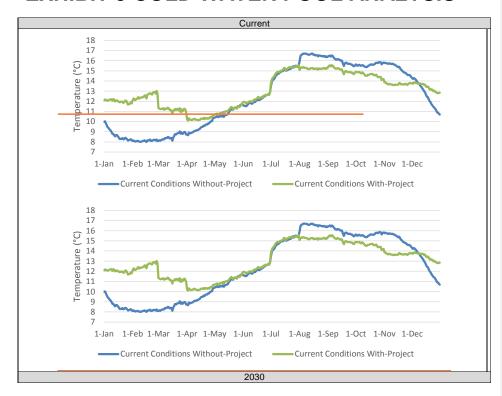
Figure 7-1. Percent Exceedence of the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for Without-Project Conditions and With-Project Conditions Under 2070 Conditions for all Water Years – At Head of Reach 1A (Friant Dam)

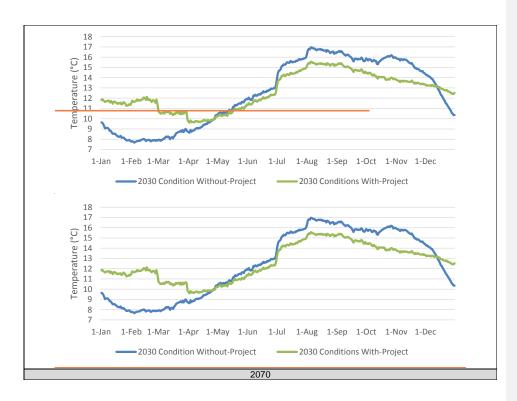
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Figure 7-2. Percent Exceedence of the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for With-Project Conditions Under Current, 2030, and 2070 Conditions for all Water Years – At Head of Reach 1 (Friant Dam)

EXHIBIT 8 COLD WATER POOL ANALYSIS





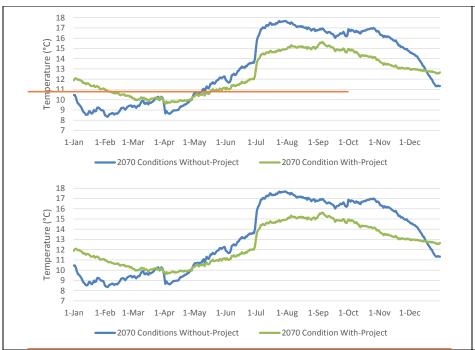


Figure 8-1. <u>Average Maximum</u> Daily Release Temperatures from Friant Dam in Wet Water Years under Current, 2030, and 2070 Conditions With and Without-Project (49831980-2003 Water Year Simulation Period)

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EXHIBIT 9 EDT RESULTS

Table 9-1. Percent Change in Abundance by San Joaquin River Restoration Program (SJRRP) Water Year Types for Spring-Run Chinook Salmon Comparing Percent Change in Productivity, Capacity, and Abundance for With-Project to Without-Project Conditions Under Current Conditions

Current Conditions	SJRRP Water Year Type	Change from Without-Project (%)
Habitat Productivity ²	Dry	4%
·	Normal-Dry	0%
	Normal-Wet	4%
	Wet	9%
Habitat Capacity ³	Dry	17%
	Normal-Dry	37%
	Normal-Wet	-9%
	Wet	-28%
Equilibrium Abundance 4	Dry	21%
	Normal-Dry	37%
	Normal-Wet	-8%
	Wet	-23%
Weighted Average Al	oundance IndexMetric 1	2%

Notes:

Further detail for EDT modeling is presented in Benefit Calculation, Monetization, and Resiliency, REVISED Attachment 5: Modeling Approach Attachment

- Uncertainty is inherent within modeling results, and due to the lack of empirical data for spring-run Chinook salmon populations in the San Joaquin River, there is no meaningful way of assessing the accuracy of the data. Further detail for EDT modeling is presented in Benefits, Calculation, Monetization, and Resiliency REVISED, Attachment 5: Modeling Approach Attachment.
- ² Habitat productivity is the number of returning adults per original spawning adult.
- ³ Habitat capacity is the number of fish that can be supported by the available habitat
- ⁴ Equilibrium abundance is the theoretical population size that habitat of a given quantity and quality (capacity and productivity) can support.

Table 9-2. Percent Change in Abundance by San Joaquin River Restoration Program (SJRRP) Water Year Types for Spring-Run Chinook Salmon Comparing Percent Change in Productivity, Capacity, and Abundance for With-Project to Without-Project Conditions Under 2030 Conditions

2030 Conditions	SJRRP Water Year Type	Change from Without-Project (%)
Habitat Productivity ²	Dry	18%
	Normal-Dry	4%
	Normal-Wet	25 22%
	Wet	27 20%
Habitat Capacity ³	Dry	-21%
	Normal-Dry	10%
	Normal-Wet	15 10%
	Wet	19 12%
Equilibrium Abundance 4	Dry	-12%
	Normal-Dry	13%
	Normal-Wet	41 <u>32</u> %
	Wet	36 25%
Weighted Average Abun	dance Index Metric 1	2 4 <u>18</u> %

Further detail for EDT modeling is presented in Benefit Calculation, Monetization, and Resiliency, REVISED Attachment 5: Modeling Approach Attachment

- Uncertainty is inherent within modeling results, and due to the lack of empirical data for spring-run Chinook salmon populations in the San Joaquin River, there is no meaningful way of assessing the accuracy of the data. Further detail for EDT modeling is presented in Benefits, Calculation, Monetization, and Resiliency, REVISED Attachment 5: Modeling Approach Attachment.
- Habitat productivity is the number of returning adults per original spawning adult. Habitat capacity is the number of fish that can be supported by the available habitat
- Equilibrium abundance is the theoretical population size that habitat of a given quantity and quality (capacity and productivity)

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Table 9-3. Percent Change in Abundance by San Joaquin River Restoration Program (SJRRP) Water Year Types for Spring-Run Chinook Salmon Comparing Percent Change in Productivity, Capacity, and Abundance for With-Project to Without-Project Conditions Under 2070 Conditions

2070 Conditions	SJRRP Water Year Type	Change from Without-Project (%)
Habitat Productivity 1,2	Dry	22%
·	Normal-Dry	130%
	Normal-Wet	39 38%
	Wet	93 <u>84</u> %
Habitat Capacity 1, 3	Dry	155%
	Normal-Dry	82%
	Normal-Wet	62 63%
	Wet	47 <u>37</u> %
Equilibrium Abundance 1,4	Dry	223%
	Normal-Dry	5105% ⁵
	Normal-Wet	116%
	Wet	212 181%
Weighted Average Abur	ndance Index Metric ¹	231 220%

Further detail for EDT modeling is presented in Benefit Calculation, Monetization, and Resiliency, REVISED Attachment 5: Modeling Approach Attachment

- Uncertainty is inherent within modeling results, and due to the lack of empirical data for spring-run Chinook salmon populations in the San Joaquin River, there is no meaningful way of assessing the accuracy of the data. Further detail for EDT modeling is presented in Benefits, Calculation, Monetization, and Resiliency, REVISED Attachment 5: Modeling Approach Attachment.
- Habitat productivity is the number of returning adults per original spawning adult. Habitat capacity is the number of fish that can be supported by the available habitat
- Equilibrium abundance is the theoretical population size that habitat of a given quantity and quality (capacity and productivity)
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EXHIBIT 10 GEOGRAPHICAL EXTENT

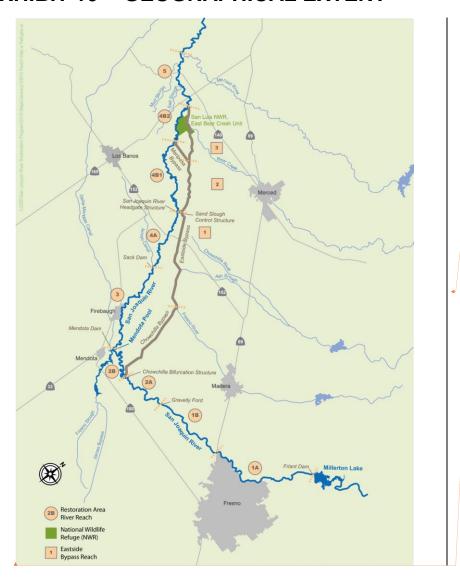


Figure 10-1. Geographical Extent of Ecosystem Flow Improvements under Current and 2030 Conditions Represented by the SJRRP Reaches in the San Joaquin River

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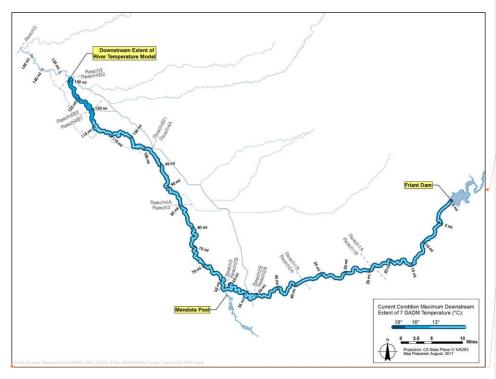


Figure 10-2. Geographical Extent of Ecosystem Temperature Improvements Under Current Conditions when the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for Threshold Criteria for Spring-run Chinook Salmon is Met under With-Project Conditions

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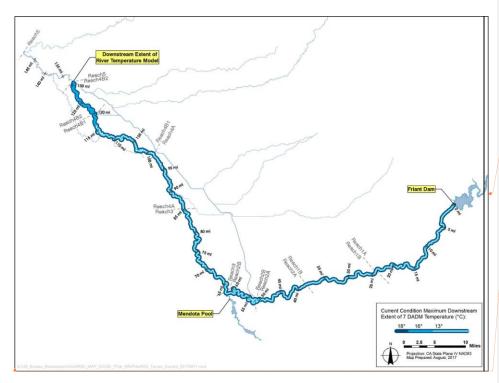


Figure 10-3. Geographical Extent of Ecosystem Temperature Improvements Under Current Conditions when the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for Threshold Criteria for Fall-run Chinook Salmon is Met under With-Project Conditions

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Figure 10-4. Geographical Extent of Ecosystem Temperature Improvements Under 2030 Conditions when the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for Threshold Criteria for Spring-run Chinook Salmon is Met under With-Project Conditions

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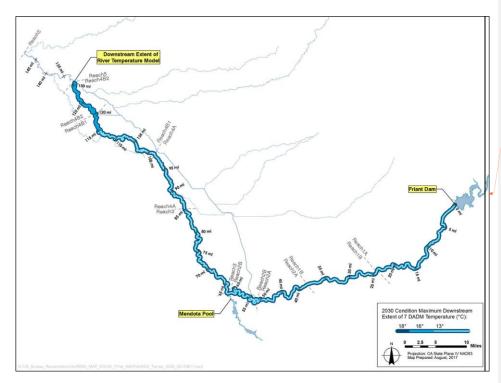


Figure 10-5. Geographical Extent of Ecosystem Temperature Improvements Under 2030 Conditions when the 7-Day Average Daily Maximum Water Temperature (7DADM) Unit for Threshold Criteria for Fall-run Chinook Salmon is Met under With-Project Conditions

EXHIBIT 11 FLOW EXCEEDENCE – SAN JOAQUIN AT FRIANT DAM – CURRENT CONDITIONS

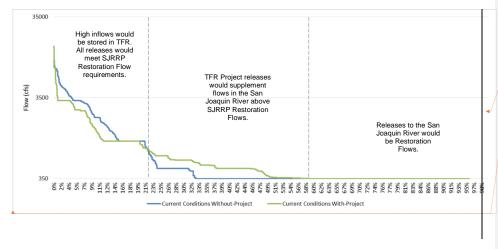


Figure 11-1. Exceedence Probability of San Joaquin River Daily Average Releases at Head of Reach 1A (Friant Dam) for All Years under Current Conditions – 1922 to 2003 Simulation Period

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EXHIBIT 12 FLOW EXCEEDENCE – SAN JOAQUIN AT FRIANT DAM – 2030 CONDITIONS

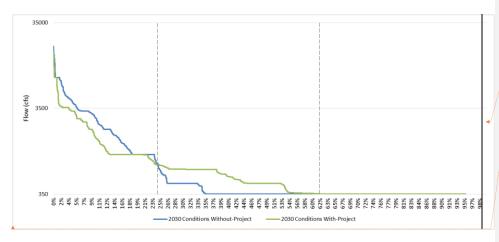


Figure 12-1. Exceedence Probability of San Joaquin River Daily Average Releases at Head of Reach 1A (Friant Dam) for All Years under 2030 Conditions – 1922 to 2003 Simulation Period

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EXHIBIT 13 FLOW EXCEEDENCE – SAN JOAQUIN AT FRIANT DAM – 2070 CONDITIONS

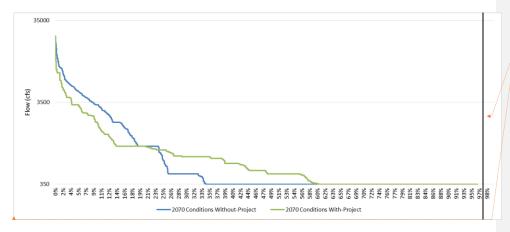


Figure 13-1. Exceedence Probability of San Joaquin River Daily Average Releases at Head of Reach 1A (Friant Dam) for All Years under 2070 Conditions

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EXHIBIT 14 MONTHLY AVERAGE FLOW – SAN JOAQUIN RIVER AT FRIANT DAM – CURRENT CONDITIONS

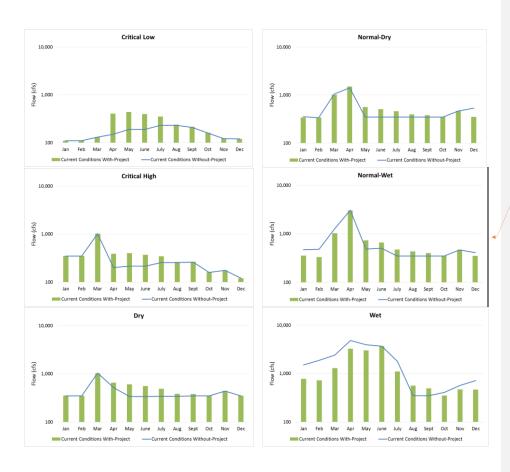


Figure 14-1. Average Simulated Monthly Flow (1922 – 2003) in the San Joaquin River at Friant Dam under Current Conditions

Table 14-1. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Critical-Low Water Years under Current Conditions

	Critical Low Year						
Month	Without-Project	With-Project	Percent	Change			
WOILLI	CFS	CFS	(-100% 1	to 200%)			
Jan	110	110	0%				
Feb	110	110	0%				
Mar	130	130	0%				
Apr	150	402	168%				
May	190	438	131%				
June	190	396	108%				
July	230	350	52%				
Aug	230	236	3%				
Sept	210	214	2%				
Oct	160	160	0%				
Nov	122	122	0%				
Dec	120	120	0%				

Table 14-2. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Critical-High Water Years under Current Conditions

Critical High Years					
Month	Without-Project	With-Project	Percent Change		
WOTILII	CFS	CFS	(-100% to 200%)		
Jan	350	350	0%		
Feb	350	350	0%		
Mar	1,016	1,016	0%		
Apr	200	389	95%		
May	215	400	86%		
June	215	370	72%		
July	255	345	35%		
Aug	255	261	2%		
Sept	260	266	2%		
Oct	160	160	0%		
Nov	176	176	0%		
Dec	120	120	0%		

Table 14-3. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Dry Water Years under Current Conditions

	Dry Years						
Month	Without-Project	With-Project	Percent Change				
	CFS	CFS	(-100% to 100%)				
Jan	350	350	0%				
Feb	350	350	0%				
Mar	1,041	1,016	-2%				
Apr	522	652	25%				
May	339	599	77%				
June	339	554	63%				
July	342	489	43%				
Aug	342	384	12%				
Sept	350	380	9%				
Oct	350	350	0%				
Nov	440	440	0%				
Dec	350	350	0%				

Table 14-4. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Normal-Dry Water Years under Current Conditions

er rears under Current Conditions							
	Normal-Dry Years						
Month	Without-Project	With-Project	Percent Change				
	CFS	CFS	(-100% t	to 100%)			
Jan	355	340	-4%				
Feb	340	340	0%				
Mar	1,052	1,016	-3%				
Apr	1,422	1,495	5%				
May	350	561	60%				
June	350	507	45%				
July	350	458	31%				
Aug	350	396	13%				
Sept	350	380	9%				
Oct	350	350	0%				
Nov	467	467	0%				
Dec	539	350	-35%				

Table 14-5. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Normal-Wet Years under Current Conditions

Normal-Wet Years						
Month	Without-Project	With-Project	Percent Change			
WOITH	CFS	CFS	(-100% t	to 100%)		
Jan	469	355	-24%			
Feb	479	331	-31%			
Mar	1,277	1,026	-20%			
Apr	3,065	3,008	-2%			
May	488	730	50%			
June	505	657	30%			
July	350	475	36%			
Aug	350	431	23%			
Sept	350	398	14%			
Oct	350	350	0%			
Nov	467	467	0%			
Dec	410	350	-15%			

Table 14-6. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Wet Years under Current Conditions

rrent Cond	aitions						
Wet Years							
Month	Without-Project	With-Project	Percent Change				
	CFS	CFS	(-100% t	0 100%)			
Jan	1,512	774	-49%				
Feb	1,886	723	-62%				
Mar	2,418	1,292	-47%				
Apr	4,837	3,249	-33%				
May	3,944	3,003	-24%				
June	3,673	3,703	1%				
July	1,794	1,095	-39%				
Aug	350	561	60%				
Sept	350	492	41%				
Oct	410	350	-15%				
Nov	572	467	-18%	<u> </u>			
Dec	715	463	-35%				

EXHIBIT 15 MONTHLY AVERAGE FLOW – SAN JOAQUIN RIVER AT FRIANT DAM – 2030 CONDITIONS

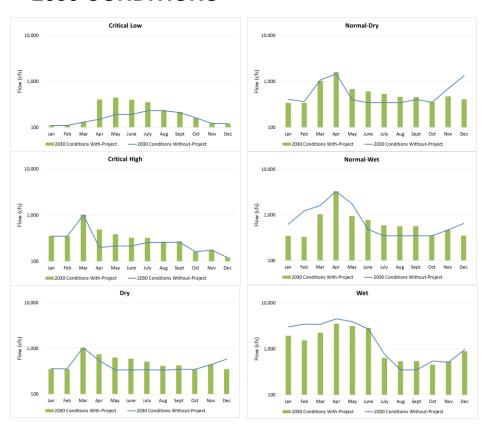


Figure 15-1. Average Simulated Monthly Flow (1922 – 2003) in the San Joaquin River at Friant Dam under 2030 Conditions

Table 15-1. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Critical-Low Water Years under 2030 Conditions

	Critical Low Year				
Month	Without-Project	With-Project	Percent	Change	
WOTILIT	CFS	CFS	(-100% t	o 200%)	
Jan	110	110	0%		
Feb	110	110	0%		
Mar	130	130	0%		
Apr	150	402	168%		
May	190	438	130%		
June	190	396	108%		
July	230	350	52%		
Aug	230	236	3%		
Sept	210	215	2%		
Oct	160	160	0%		
Nov	122	122	0%		
Dec	120	120	0%		

Table 15-2. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Critical-High Water Years under 2030 Conditions

Critical High Years					
	Without-Project		Percent	Change	
Month	CFS	CFS	(-100% t	•	
Jan	350	350	0%		
Feb	350	350	0%		
Mar	1,016	1,016	0%		
Apr	200	485	143%		
May	215	381	77%		
June	215	323	50%		
July	255	319	25%		
Aug	255	263	3%		
Sept	260	267	3%		
Oct	160	160	0%		
Nov	176	176	0%		
Dec	120	120	0%		

Table 15-3. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Dry Water Years under 2030 Conditions

	Dry Years				
Month	Without-Project	With-Project	Percent Change		
WOTILIT	CFS	CFS	(-100% t	o 100%)	
Jan	360	350	-3%		
Feb	355	350	-2%		
Mar	1,041	1,016	-2%		
Apr	545	737	35%		
May	339	628	85%		
June	339	593	75%		
July	342	509	49%		
Aug	335	412	23%		
Sept	350	423	21%		
Oct	350	350	0%		
Nov	438	440	1%		
Dec	585	350	-40%		

Table 15-4. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Normal-Dry Water Years under 2030 Conditions

e <u>r rears u</u>	nder 2030 Condit	ions		
	Norn	nal-Dry Years		
Month	Without-Project	With-Project	Percent	Change
WOTILIT	CFS	CFS	(-100% 1	to 100%)
Jan	406	340	-16%	
Feb	362	340	-6%	
Mar	1,066	1,016	-5%	
Apr	1,459	1,593	9%	
May	398	684	72%	
June	343	600	75%	
July	345	528	53%	
Aug	345	458	33%	
Sept	401	454	13%	
Oct	351	350	0%	
Nov	697	467	-33%	
Dec	1,328	405	-70%	

Table 15-5. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Normal-Wet Years under 2030 Conditions

Normal-Wet Years				
Month	Without-Project	With-Project	Percent Change	
WOITH	CFS	CFS	(-100% to 100%)	
Jan	624	346	-45%	
Feb	1,220	331	-73%	
Mar	1,604	1,026	-36%	
Apr	3,275	3,241	-1%	
May	1,757	942	-46%	
June	483	769	59%	
July	350	585	67%	
Aug	350	556	59%	
Sept	350	562	60%	
Oct	350	350	0%	
Nov	467	467	0%	
Dec	647	350	-46%	

Table 15-6. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Wet Years under 2030 Conditions

Wet Years				
Month	Without-Project	With-Project	Percent Change	
WOTILIT	CFS	CFS	(-100% to 100%)	
Jan	3,005	1,923	-36%	
Feb	3,453	1,533	-56%	
Mar	3,426	2,249	-34%	
Apr	4,510	3,502	-22%	
May	3,891	3,131	-20%	
June	2,726	2,841	4%	
July	762	632	-17%	
Aug	350	533	52%	
Sept	350	540	54%	
Oct	546	451	-17%	
Nov	511	528	3%	
Dec	966	879	-9%	

EXHIBIT 16 MONTHLY AVERAGE FLOW – SAN JOAQUIN RIVER AT FRIANT DAM – 2070 CONDITIONS

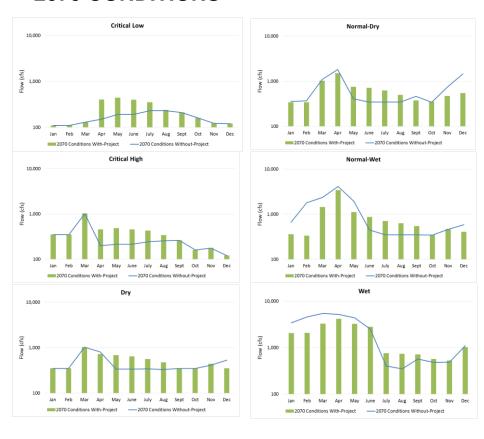


Figure 16-1. Average Simulated Monthly Flow (1922 – 2003) in the San Joaquin River at Friant Dam under 2070 Conditions

Table 16-1. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Critical-Low Water Years under 2070 Conditions

	Critical Low Year					
Month	Without-Project	With-Project	Percent Change			
WOITH	CFS	CFS	(-100% to 200%)			
Jan	110	110	0%			
Feb	110	110	0%			
Mar	130	130	0%			
Apr	150	402	168%			
May	190	439	131%			
June	190	397	109%			
July	230	352	53%			
Aug	230	239	4%			
Sept	210	210	0%			
Oct	160	160	0%			
Nov	122	122	0%			
Dec	120	120	0%			

Table 16-2. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Critical-High Water Years under 2070 Conditions

t <u>er Years t</u>	inder 2070 Cond	litions				
	Critical High Years					
Month	Without-Project	With-Project	Percent	Change		
WOITH	CFS	CFS	(-100% t	o 200%)		
Jan	350	350	0%	i		
Feb	350	350	0%			
Mar	1,016	1,016	0%			
Apr	200	452	126%			
May	215	481	124%			
June	215	453	111%			
July	242	425	75%			
Aug	255	340	33%			
Sept	260	260	0%			
Oct	160	160	0%			
Nov	176	176	0%			
Dec	120	120	0%			

Table 16-3. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Dry Water Years under 2070 Conditions

	0	ry Years			
Month	Without-Project	With-Project	Percent	Change	•
WOTILII	CFS	CFS	(-100%	to 100%)	
Jan	350	350	0%		
Feb	350	350	0%		
Mar	1,025	1,016	-1%	i	
Apr	807	714	-11%		
May	339	678	100%		
June	339	638	88%		
July	342	560	64%		
Aug	332	473	42%		
Sept	350	351	0%		
Oct	350	350	0%		
Nov	412	440	7%		
Dec	536	350	-35%		

Table 16-4. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Normal-Dry Water Years under 2070 Conditions

	Norr	mal-Dry Years		
Month	Without-Project	With-Project	Percent	Change
WOTILIT	CFS	CFS	(-100%	to 100%)
Jan	354	340	-4%	
Feb	369	340	-8%	
Mar	1,090	1,016	-7%	
Apr	1,803	1,502	-17%	
May	409	748	83%	
June	343	712	107%	
July	345	621	80%	
Aug	345	492	42%	
Sept	462	371	-20%	
Oct	341	350	3%	
Nov	737	467	-37%	
Dec	1,455	541	-63%	

Table 16-5. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Normal-Wet Years under 2070 Conditions

Normal-Wet Years				
Month	Without-Project	With-Project	Percent Chang	
WOILLI	CFS	CFS	(-100% t	o 100%)
Jan	663	358	-46%	
Feb	1,795	333	-81%	
Mar	2,347	1,434	-39%	
Apr	4,093	3,406	-17%	<u> </u>
May	1,933	1,112	-42%	
June	448	860	92%	
July	350	701	100%	
Aug	350	624	78%	
Sept	350	543	55%	
Oct	345	350	1%	
Nov	459	467	2%	
Dec	586	407	-31%	

Table 16-6. Average Simulated Monthly Flow in the San Joaquin River at Friant Dam for Wet Years under 2070 Conditions

	W	et Years		
Month	Without-Project	With-Project	Percent	Change
WOTILII	CFS	CFS	(-100%	to 100%)
Jan	3,420	2,048	-40%	
Feb	4,573	2,066	-55%	
Mar	5,413	3,241	-40%	
Apr	5,178	4,114	-21%	
May	4,369	3,221	-26%	
June	2,510	2,787	11%	
July	402	753	87%	
Aug	350	731	109%	
Sept	569	712	25%	
Oct	483	562	16%	
Nov	486	526	8%	
Dec	1,100	1,021	-7%	

EXHIBIT 17 MONTHLY RELEASE PATTERN – CURRENT CONDITIONS

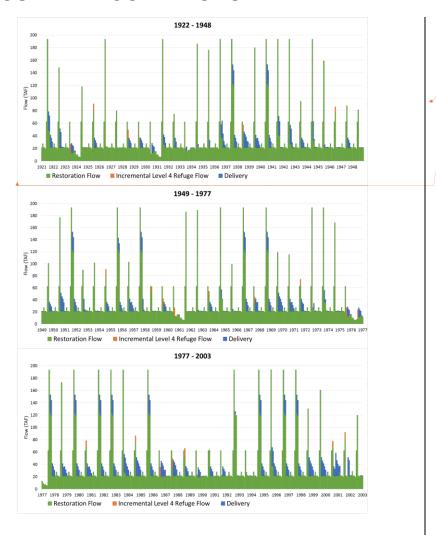


Figure 17-1. Monthly Objective Release Pattern from Friant Dam for the Temperance Flat Reservoir Project for Simulation Period of 1922-2003 Water Years under Current Conditions

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Figure 17-2. Monthly Releases from Friant Dam for the Temperance Flat Reservoir Project for Simulation Period of 1922-2003 Water Years under Current Conditions (Note the axis change in 1922-1948 time period)

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EXHIBIT 18 MONTHLY RELEASE PATTERN – 2030 CONDITIONS

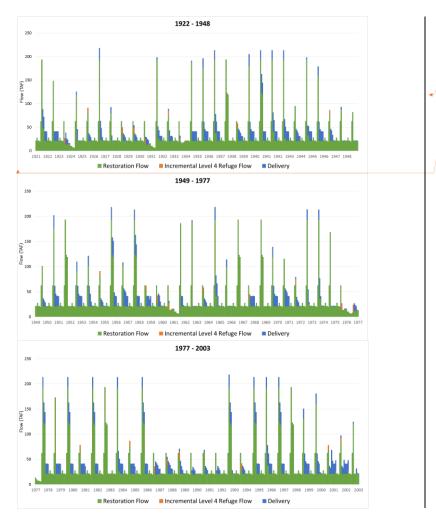


Figure 18-1. Monthly Objective Release Pattern from Friant Dam for the Temperance Flat Reservoir Project for Simulation Period of 1922-2003 Water Years under 2030 Conditions

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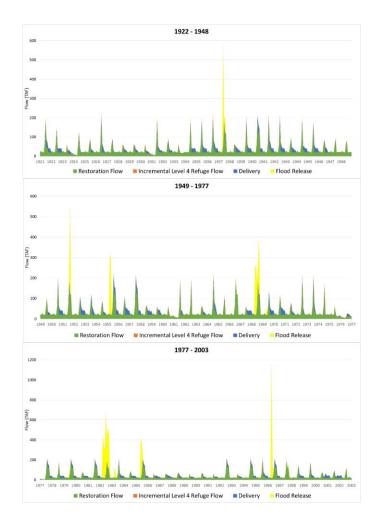


Figure 18-2. Monthly Releases from Friant Dam for the Temperance Flat Reservoir Project for Simulation Period of 1922-2003 Water Years under 2030 Conditions (Note the axis change in 1977-2003 time period)

EXHIBIT 19 MONTHLY RELEASE PATTERN – 2070 CONDITIONS

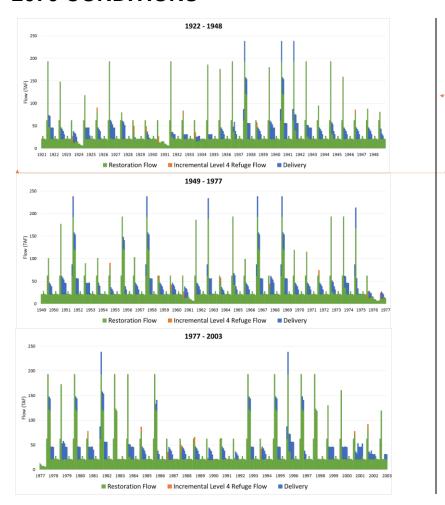


Figure 19-1. Monthly Objective Releases from Friant Dam for the Temperance Flat Reservoir Project for Simulation Period of 1922-2003 Water Years under 2070 Conditions

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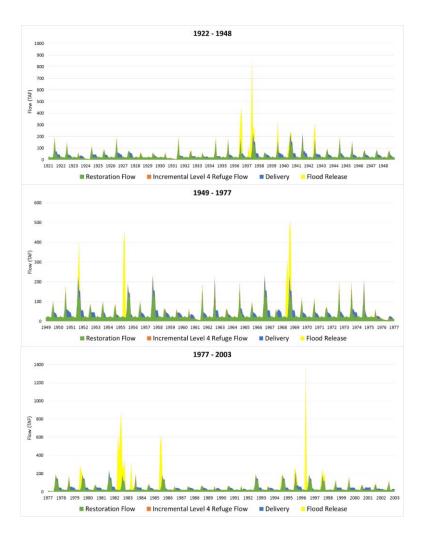


Figure 19-2. Monthly Releases from Friant Dam for the Temperance Flat Reservoir Project for Simulation Period of 1922-2003 Water Years under 2070 Conditions (Note the axis change in each time period)

EXHIBIT 20 SAN JOAQUIN RIVER RESTORATION PROGRAM (SJRRP) – FLOW MANAGEMENT AND SCHEDULE

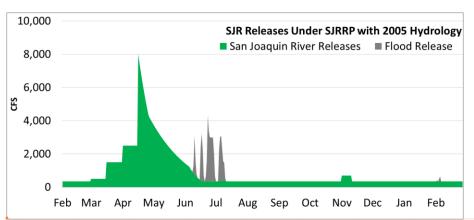


Figure 20-1. Simulated SJRRP Restoration Flow Management of 2005 Historical Hydrology

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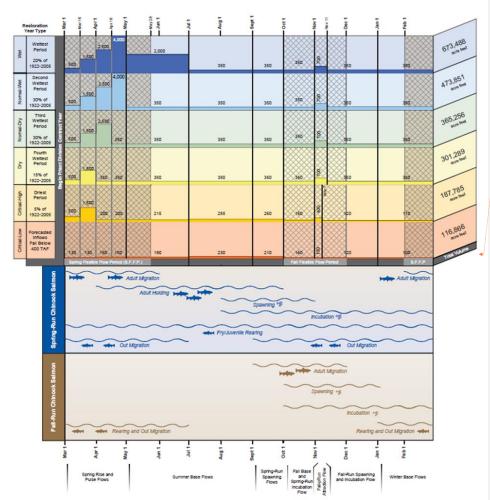


Figure 20-2. Restoration Flow Schedule Specific in Exhibit B of the Settlement

EXHIBIT 21 FLOODPLAIN ACTIVATION FLOW – CURRENT CONDITIONS

Table 21-1. Summary of Floodplain Activation Flow Analysis for All Years under Current Conditions

	Current Conditions - All Years								
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)				
	SJR 1A1	Friant Dam to Hwy 41	1149	1317	159				
4	SJR 1A2	Hwy 41 to Hwy 99	1061	1229	169				
'	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	949	1117	189				
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	884	1046	189				
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	858	1020	199				
2	SJR2B1	Chowchilla Bypass to Mendota Bypass	853	1015	199				
Mendota		Mendota Bypass	N/A	N/A	N/A				
3	SJR 3B	Mendota Bypass return to Avenue 7.5	1111	1263	149				
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	1112	1264	149				
	SJR 4A1	Sack Dam to Hwy 152	877	1049	209				
	SJR 4A2	Hwy 152 to Sand Slough Connector	877	1049	209				
4	SJR4B 1A & 1B	Sand Slough Connector to Turner Ave	476	476	0				
	SJR4B 1C and 1D	Turner Ave to Mariposa Bypass	476	476	0				
	SJR 4B2	Mariposa Bypass to Bear Creek	877	1049	209				
	SJR 5A	Bear Creek to Salt Slough	1200	1360	139				
5	SJR 5B	Salt Slough to Mud Slough	1481	1511	29				
	SJR 5C	Mud Slough to Merced River	1794	1661	-79				

Table 21-2. Summary of Floodplain Activation Flow Analysis for Dry Years under Current Conditions

SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)
	SJR 1A1	Friant Dam to Hwy 41	1016	1016	09
1	SJR 1A2 SJR 1B1	Hwy 41 to Hwy 99 Hwy 99 to Hwy 145 (Madera Ave.)	936 833	936 833	09
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	774	774	09
2	SJR 2A SJR2B1	Gravelly Ford to Chowchilla Bypass Chowchilla Bypass to Mendota Bypass	750 745	750 745	09
Mendota	100	Mendota Bypass	N/A	N/A	N/A
2	SJR 3B	Mendota Bypass return to Avenue 7.5	961	961	0%
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	961	961	0%
	SJR 4A1	Sack Dam to Hwy 152	751	750	0%
	SJR 4A2	Hwy 152 to Sand Slough Connector	751	750	0%
4	SJR4B 1A & 1B	Sand Slough Connector to Turner Ave	476	476	09
	SJR4B 1C and 1D	Turner Ave to Mariposa Bypass	476	476	09
	SJR 4B2	Mariposa Bypass to Bear Creek	751	750	09
	SJR 5A	Bear Creek to Salt Slough	820	820	09
5	SJR 5B	Salt Slough to Mud Slough	1146	1146	0%
	SJR 5C	Mud Slough to Merced River	1369	1365	0%

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Table 21-3. Summary of Floodplain Activation Flow Analysis for Normal-Dry Years under Current Conditions

Current Conditions - Normal Dry Years							
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent 0 (-50% to		
	SJR 1A1	Friant Dam to Hwy 41	1142	1311		15%	
1	SJR 1A2 SJR 1B1	Hwy 41 to Hwy 99 Hwy 99 to Hwy 145 (Madera Ave.)	1055 942	1223 1111		16% 18%	
2	SJR 1B2 SJR 2A	Hwy 145 (Madera Ave.) to Gravelly Ford Gravelly Ford to Chowchilla Bypass	878 852	1046 1020		19% 20%	
Mendota	SJR2B1	Chowchilla Bypass to Mendota Bypass Mendota Bypass	847 N/A	1015 N/A	N/A	20% A	
3	SJR 3B SJR 3C	Mendota Bypass return to Avenue 7.5 Avenue 7.5 (Firebaugh) to Sack Dam	1076 1077	1263 1264		17% 17%	
	SJR 4A1 SJR 4A2	Sack Dam to Hwy 152 Hwy 152 to Sand Slough Connector	842 842	1049 1049		24% 24%	
4	SJR4B 1A & 1B SJR4B 1C and 1D	Sand Slough Connector to Turner Ave Turner Ave to Mariposa Bypass	476 476	476 476		0% 0%	
	SJR 4B2 SJR 5A	Mariposa Bypass to Bear Creek Bear Creek to Salt Slough	843 1150	1049 1253		24% 9%	
5	SJR 5B	Salt Slough to Mud Slough	1377	1477		7%	
	SJR 5C	Mud Slough to Merced River	1664	1655	1	-1%	

Table 21-4. Summary of Floodplain Activation Flow Analysis for Normal-Wet Years under Current Conditions

	Current Conditions - Normal Wet Years							
SJRRP Reach	EDT Reach Description Without Project		Without Project (cfs)	With Project (cfs)	Percent (-50% t			
	SJR 1A1	Friant Dam to Hwy 41	2700	2700		0%		
4	SJR 1A2	Hwy 41 to Hwy 99	2589	2500		-3%		
ı	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	2447	2245		-8%		
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	2366	2099		-11%		
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	2332	2039		-13%		
2	SJR2B1	Chowchilla Bypass to Mendota Bypass	2325	2029	-13'			
Mendota		Mendota Bypass	N/A	N/A	N.	/A		
3	SJR 3B	Mendota Bypass return to Avenue 7.5	2613	2174		-17%		
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	2614	2174		-17%		
	SJR 4A1	Sack Dam to Hwy 152	2379	2036		-14%		
	SJR 4A2	Hwy 152 to Sand Slough Connector	2379	2036		-14%		
4	SJR4B 1A & 1B	Sand Slough Connector to Turner Ave	476	476		0%		
	SJR4B 1C and 1D	Turner Ave to Mariposa Bypass	476	476		0%		
	SJR 4B2	Mariposa Bypass to Bear Creek	2380	2037		-14%		
	SJR 5A	Bear Creek to Salt Slough	2739	2395		-13%		
5	SJR 5B	Salt Slough to Mud Slough	2896	2547		-12%		
	SJR 5C	Mud Slough to Merced River	2986	2629		-12%		

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Table 21-5. Summary of Floodplain Activation Flow Analysis for Wet Years under Current Conditions

		Current Cond	itions - Wet Years			
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)		Change to 50%)
	SJR 1A1	Friant Dam to Hwy 41	4274	3249		-24%
4	SJR 1A2	Hwy 41 to Hwy 99	4557	3130		-31%
1	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	4690	2977		-37%
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	4766	2890		-39%
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	4797	2854		-41%
2	SJR2B1	Chowchilla Bypass to Mendota Bypass	2865	2846		-1%
Mendota	•	Mendota Bypass	N/A	N/A	N/A	
3	SJR 3B	Mendota Bypass return to Avenue 7.5	5470	2871		-48%
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	5471	2872		-48%
	SJR 4A1	Sack Dam to Hwy 152	5236	2637		-50%
	SJR 4A2	Hwy 152 to Sand Slough Connector	5236	2637		-50%
4	SJR4B 1A & 1B	Sand Slough Connector to Turner Ave	476	476		0%
	SJR4B 1C and 1D	Turner Ave to Mariposa Bypass	476	476		0%
	SJR 4B2	Mariposa Bypass to Bear Creek	7191	2639		-63%
	SJR 5A	Bear Creek to Salt Slough	8433	3184		-62%
5	SJR 5B	Salt Slough to Mud Slough	8679	3319		-62%
	SJR 5C	Mud Slough to Merced River	8852	3398		-62%

* Indicates greater than 50% change

EXHIBIT 22 FLOODPLAIN ACTIVATION FLOW – 2030 CONDITIONS

Table 22-1. Summary of Floodplain Activation Flow Analysis for All Years under 2030 Conditions

	2030 Conditions - All Years							
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)			
	SJR 1A1	Friant Dam to Hwy 41	1066	1317	24%			
1 .	SJR 1A2	Hwy 41 to Hwy 99	978	1229	26%			
'	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	866	1117	29%			
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	802	1052	31%			
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	776	1026	32%			
	SJR2B1	Chowchilla Bypass to Mendota Bypass	772	1021	32%			
Mendota	-	Mendota Bypass	N/A	N/A	N/A			
3	SJR 3B	Mendota Bypass return to Avenue 7.5	1003	1298	29%			
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	1004	1299	29%			
	SJR 4A1	Sack Dam to Hwy 152	812	1064	31%			
	SJR 4A2	Hwy 152 to Sand Slough Connector	812	1064	31%			
4	SJR4B 1A & 1E	Sand Slough Connector to Turner Ave	476	476	0%			
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476	0%			
	SJR 4B2	Mariposa Bypass to Bear Creek	812	1065	31%			
	SJR 5A	Bear Creek to Salt Slough	940	1376	46%			
5	SJR 5B	Salt Slough to Mud Slough	1165	1529	31%			
	SJR 5C	Mud Slough to Merced River	1464	1661	14%			

Table 22-2. Summary of Floodplain Activation Flow Analysis for Dry Years under 2030 Conditions

	2030 Conditions - Dry Years							
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)			
	SJR 1A1	Friant Dam to Hwy 41	814	1016	25%			
1	SJR 1A2	Hwy 41 to Hwy 99	734	936	27%			
'	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	633	833	32%			
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	575	774	35%			
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	551	750	36%			
	SJR2B1	Chowchilla Bypass to Mendota Bypass	547	745	36%			
Mendota		Mendota Bypass	N/A	N/A	N/A			
3	SJR 3B	Mendota Bypass return to Avenue 7.5	656	961	47%			
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	656	961	47%			
	SJR 4A1	Sack Dam to Hwy 152	402	750	86%			
	SJR 4A2	Hwy 152 to Sand Slough Connector	402	750	86%			
4	SJR4B 1A & 1I	Sand Slough Connector to Turner Ave	398	476	19%			
	SJR4B 1C and	Turner Ave to Mariposa Bypass	398	476	19%			
	SJR 4B2	Mariposa Bypass to Bear Creek	403	750	86%			
	SJR 5A	Bear Creek to Salt Slough	484	820	69%			
5	SJR 5B	Salt Slough to Mud Slough	798	1146	44%			
	SJR 5C	Mud Slough to Merced River	1018	1365	34%			

^{*} Indicates greater than 50% change

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Table 22-3. Summary of Floodplain Activation Flow Analysis for Normal-Dry Years under 2030 Conditions

	2030 Conditions - Normal Dry Years							
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)			
	SJR 1A1	Friant Dam to Hwy 41	963	1311	36%			
	SJR 1A2	Hwy 41 to Hwy 99	875	1223	40%			
	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	763	1111	45%			
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	699	1046	50%			
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	673	1020	52%			
2	SJR2B1	Chowchilla Bypass to Mendota Bypass	669	1015	52%			
Mendota	•	Mendota Bypass	N/A	N/A	N/A			
3	SJR 3B	Mendota Bypass return to Avenue 7.5	935	1263	35%			
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	935	1264	35%			
	SJR 4A1	Sack Dam to Hwy 152	701	1029	47%			
	SJR 4A2	Hwy 152 to Sand Slough Connector	701	1029	47%			
4	SJR4B 1A & 1I	Sand Slough Connector to Turner Ave	476	476	0%			
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476	0%			
	SJR 4B2	Mariposa Bypass to Bear Creek	701	1030	47%			
	SJR 5A	Bear Creek to Salt Slough	924	1253	36%			
5	SJR 5B	Salt Slough to Mud Slough	1159	1477	27%			
	SJR 5C	Mud Slough to Merced River	1440	1655	15%			

^{*} Indicates greater than 50% change

Table 22-4. Summary of Floodplain Activation Flow Analysis for Normal-Wet Years under 2030 Conditions

	2030 Conditions - Normal Wet Years							
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)			
	SJR 1A1	Friant Dam to Hwy 41	1856	3037	64%			
	SJR 1A2	Hwy 41 to Hwy 99	1768	3023	71%			
'	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	1654	3004	82%			
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	1589	2994	88%			
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	1562	2990	91%			
	SJR2B1	Chowchilla Bypass to Mendota Bypass	1558	2985	92%			
Mendota	•	Mendota Bypass	N/A	N/A	N/A			
3	SJR 3B	Mendota Bypass return to Avenue 7.5	1745	2953	69%			
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	1746	2954	69%			
	SJR 4A1	Sack Dam to Hwy 152	1511	2719	80%			
	SJR 4A2	Hwy 152 to Sand Slough Connector	1511	2719	80%			
4	SJR4B 1A & 1I	Sand Slough Connector to Turner Ave	476	476	0%			
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476	0%			
	SJR 4B2	Mariposa Bypass to Bear Creek	1513	2721	80%			
	SJR 5A	Bear Creek to Salt Slough	1720	3080	79%			
5	SJR 5B	Salt Slough to Mud Slough	1876	3237	73%			
	SJR 5C	Mud Slough to Merced River	2164	3326	54%			

^{*} Indicates greater than 50% change

Table 22-5. Summary of Floodplain Activation Flow Analysis for Wet Years under 2030 Conditions

Contain	7113								
	2030 Conditions - Wet Years								
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent C (-50% to				
	SJR 1A1	Friant Dam to Hwy 41	4160	3585		-14%			
	SJR 1A2	Hwy 41 to Hwy 99	4041	3550		-12%			
	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	3888	3862		-1%			
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	3801	4057		7%			
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	3765	4187		11%			
	SJR2B1	Chowchilla Bypass to Mendota Bypass	2896	3266		13%			
Mendota		Mendota Bypass	N/A	N/A	N/A				
3	SJR 3B	Mendota Bypass return to Avenue 7.5	4526	4903		8%			
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	4540	4904		8%			
	SJR 4A1	Sack Dam to Hwy 152	4314	4669		8%			
	SJR 4A2	Hwy 152 to Sand Slough Connector	4317	4669		8%			
4	SJR4B 1A & 1	Sand Slough Connector to Turner Ave	476	476		0%			
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476		0%			
	SJR 4B2	Mariposa Bypass to Bear Creek	6149	6538		6%			
	SJR 5A	Bear Creek to Salt Slough	7775	7859		1%			
5	SJR 5B	Salt Slough to Mud Slough	7921	8176		3%			
	SJR 5C	Mud Slough to Merced River	8023	8280		3%			

EXHIBIT 23 FLOODPLAIN ACTIVATION FLOW – 2070 CONDITIONS

Table 23-1. Summary of Floodplain Activation Flow Analysis for All Years under 2070 Conditions

		2070 Con	ditions - All Years			
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Cha (-50% to 50	
	SJR 1A1	Friant Dam to Hwy 41	1149	1317		15%
1	SJR 1A2	Hwy 41 to Hwy 99	1061	1229		16%
	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	949	1117		18%
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	884	1046		18%
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	858	1020		19%
	SJR2B1	Chowchilla Bypass to Mendota Bypass	853	1015		19%
Mendota		Mendota Bypass	N/A	N/A	N/A	
•	SJR 3B	Mendota Bypass return to Avenue 7.5	1111	1263		14%
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	1112	1264		14%
	SJR 4A1	Sack Dam to Hwy 152	877	1049		20%
	SJR 4A2	Hwy 152 to Sand Slough Connector	877	1049		20%
4	SJR4B 1A & 1E	Sand Slough Connector to Turner Ave	476	476		0%
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476		0%
	SJR 4B2	Mariposa Bypass to Bear Creek	877	1049		20%
	SJR 5A	Bear Creek to Salt Slough	1200	1360		13%
5	SJR 5B	Salt Slough to Mud Slough	1481	1511		2%
	SJR 5C	Mud Slough to Merced River	1794	1661		-7%

Table 23-2. Summary of Floodplain Activation Flow Analysis for Dry Years under 2070 Conditions

		2070 Con	ditions - Dry Years		
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)
	SJR 1A1	Friant Dam to Hwy 41	1016	1016	0%
	SJR 1A2	Hwy 41 to Hwy 99	936	936	0%
'	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	833	833	0%
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	774	774	0%
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	750	750	0%
	SJR2B1	Chowchilla Bypass to Mendota Bypass	745	745	0%
Mendota		Mendota Bypass	N/A	N/A	N/A
3	SJR 3B	Mendota Bypass return to Avenue 7.5	961	961	0%
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	961	961	0%
	SJR 4A1	Sack Dam to Hwy 152	750	750	0%
	SJR 4A2	Hwy 152 to Sand Slough Connector	750	750	0%
4	SJR4B 1A & 1	Sand Slough Connector to Turner Ave	476	476	0%
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476	0%
	SJR 4B2	Mariposa Bypass to Bear Creek	750	750	0%
	SJR 5A	Bear Creek to Salt Slough	820	820	0%
5	SJR 5B	Salt Slough to Mud Slough	1146	1146	0%
	SJR 5C	Mud Slough to Merced River	1365	1365	0%

Table 23-3. Summary of Floodplain Activation Flow Analysis for Normal-Dry Years under 2070 Conditions

		2070 Condition	ons - Normal Dry Years			
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent Change (-50% to 50%)	
	SJR 1A1	Friant Dam to Hwy 41	1142	1311	•	15%
1	SJR 1A2	Hwy 41 to Hwy 99	1055	1223	•	16%
'	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	942	1111	1	18%
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	878	1046	1	19%
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	852	1020	2	20%
2	SJR2B1	Chowchilla Bypass to Mendota Bypass	847	1015	2	20%
Mendota		Mendota Bypass	N/A	N/A	N/A	
3	SJR 3B	Mendota Bypass return to Avenue 7.5	1087	1255	4	15%
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	1088	1256	•	15%
	SJR 4A1	Sack Dam to Hwy 152	853	1021	2	20%
	SJR 4A2	Hwy 152 to Sand Slough Connector	853	1021	2	20%
4	SJR4B 1A & 18	Sand Slough Connector to Turner Ave	476	476		0%
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476		0%
	SJR 4B2	Mariposa Bypass to Bear Creek	854	1022	2	20%
	SJR 5A	Bear Creek to Salt Slough	1145	1245		9%
5	SJR 5B	Salt Slough to Mud Slough	1365	1476		8%
	SJR 5C	Mud Slough to Merced River	1659	1659		0%

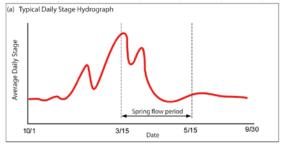
Table 23-4. Summary of Floodplain Activation Flow Analysis for Normal-Wet Years under 2070 Conditions

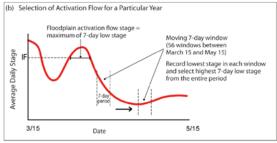
		2070 Condition	ns - Normal Wet Years			
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)	Percent (-50% t	Change o 50%)
	SJR 1A1	Friant Dam to Hwy 41	3249	2700		-17%
	SJR 1A2	Hwy 41 to Hwy 99	3130	2867		-8%
'	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	2977	2977		0%
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	2890	2890		0%
	SJR 2A	Gravelly Ford to Chowchilla Bypass	2854	2854		0%
2	SJR2B1	Chowchilla Bypass to Mendota Bypass	2846	2846		0%
Mendota	•	Mendota Bypass	N/A	N/A	N/A	
3	SJR 3B	Mendota Bypass return to Avenue 7.5	3119	2549		-18%
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	3120	2550		-18%
	SJR 4A1	Sack Dam to Hwy 152	2886	2315		-20%
	SJR 4A2	Hwy 152 to Sand Slough Connector	2886	2315		-20%
4	SJR4B 1A & 1I	Sand Slough Connector to Turner Ave	476	476		0%
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476		0%
	SJR 4B2	Mariposa Bypass to Bear Creek	2887	2317		-20%
	SJR 5A	Bear Creek to Salt Slough	3094	2676		-14%
5	SJR 5B	Salt Slough to Mud Slough	3250	2833		-13%
	SJR 5C	Mud Slough to Merced River	3308	2922		-12%

Table 23-5. Summary of Floodplain Activation Flow Analysis for Wet Years under 2070 Conditions

		2070 Cone	ditions - Wet Years			
SJRRP Reach	EDT Reach	Description	Without Project (cfs)	With Project (cfs)		Change to 50%)
	SJR 1A1	Friant Dam to Hwy 41	6103	4006		-34%
4	SJR 1A2	Hwy 41 to Hwy 99	6331	4224		-33%
	SJR 1B1	Hwy 99 to Hwy 145 (Madera Ave.)	6620	4502		-32%
	SJR 1B2	Hwy 145 (Madera Ave.) to Gravelly Ford	6785	4660		-31%
2	SJR 2A	Gravelly Ford to Chowchilla Bypass	6854	4726		-31%
2	SJR2B1	Chowchilla Bypass to Mendota Bypass	3755	4500		20%
Mendota	•	Mendota Bypass	N/A	N/A	N/A	
3	SJR 3B	Mendota Bypass return to Avenue 7.5	5284	3632		-31%
3	SJR 3C	Avenue 7.5 (Firebaugh) to Sack Dam	5285	3632		-31%
	SJR 4A1	Sack Dam to Hwy 152	5073	3421		-33%
	SJR 4A2	Hwy 152 to Sand Slough Connector	5073	3421		-33%
4	SJR4B 1A & 1I	Sand Slough Connector to Turner Ave	476	476		0%
	SJR4B 1C and	Turner Ave to Mariposa Bypass	476	476		0%
	SJR 4B2	Mariposa Bypass to Bear Creek	8976	4496		-50%
	SJR 5A	Bear Creek to Salt Slough	10707	6774		-37%
5	SJR 5B	Salt Slough to Mud Slough	10865	6924		-36%
	SJR 5C	Mud Slough to Merced River	10969	7028		-36%

EXHIBIT 24 FLOODPLAIN ACTIVATION ANALYSIS PROCEDURE





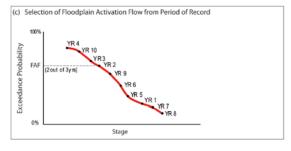


Figure 24-1. Example of Floodplain Activation Analysis Procedure

EXHIBIT 25 REFUGES IN THE EXTENDED PROJECT AREA

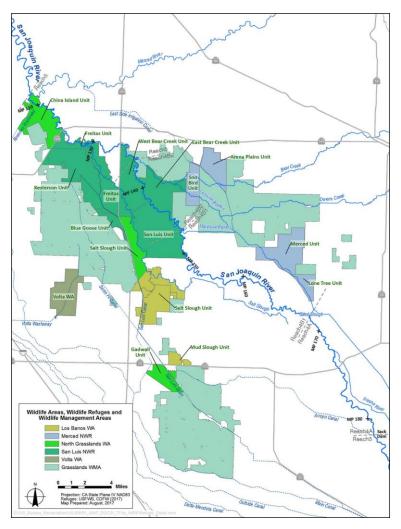


Figure 25-1. San Joaquin Valley Wildlife Areas, Wildlife Refuges and Wildlife Management Areas in the Extended Project Area.

-	Temperance Flat Reservoir Project	
Physical Public Benefits Ecosystem Benefits Exhibits REVISED A2.1	August 2017February 2018 – 25-1	